

ACTIVITIES in LIFE SCIENCES

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At the middle school level, students require the understanding of the processes of life science. This booklet contains some of essential activities to be done by students to gain practical and hands-on experiences in life science.

In the activities described herein, the locally available materials have been used along with some common chemicals. All the activities may not be possible in all schools. Nevertheless, some representative activities can be done in every school to provide students the first hand feel of process-based science learning.

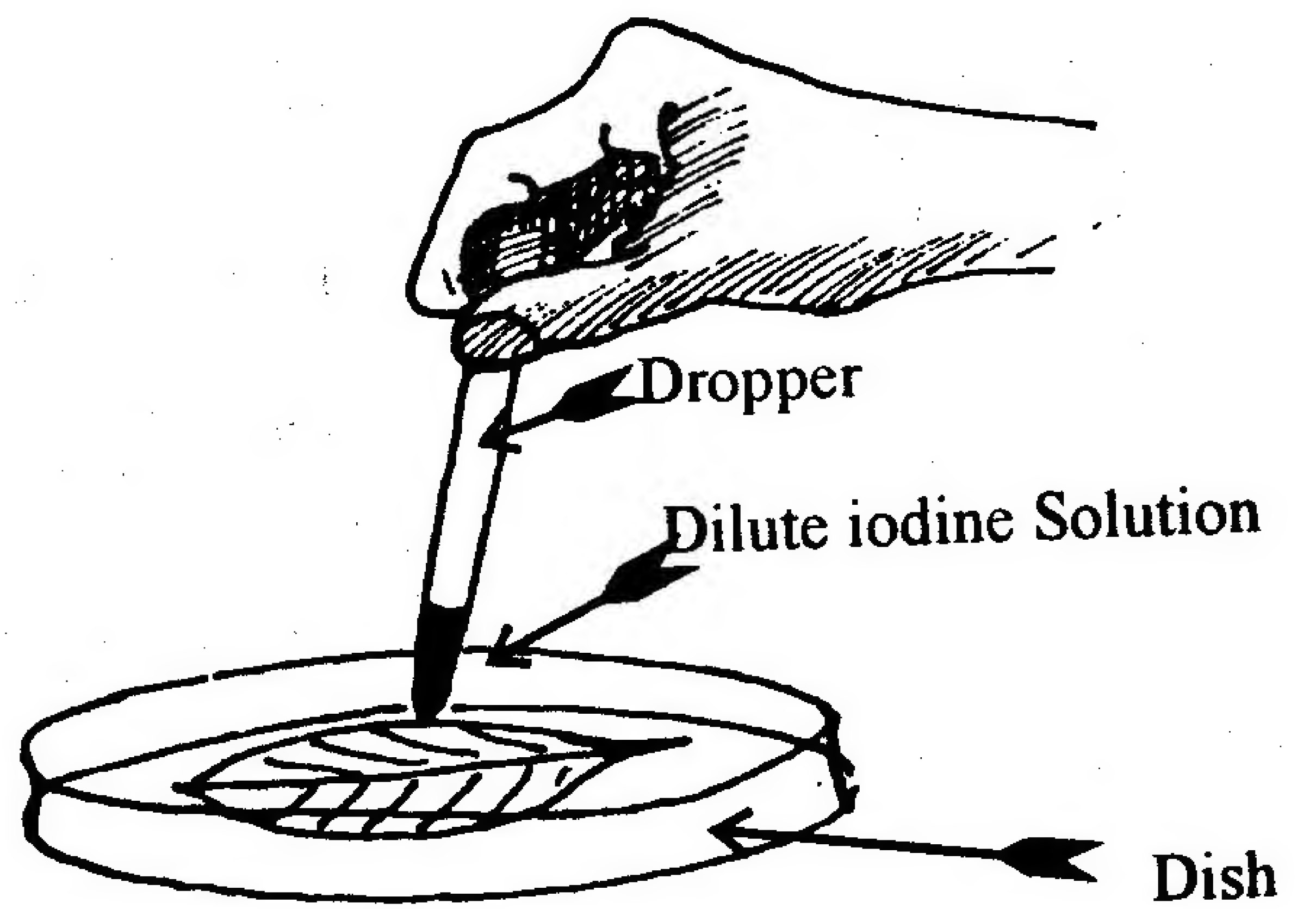
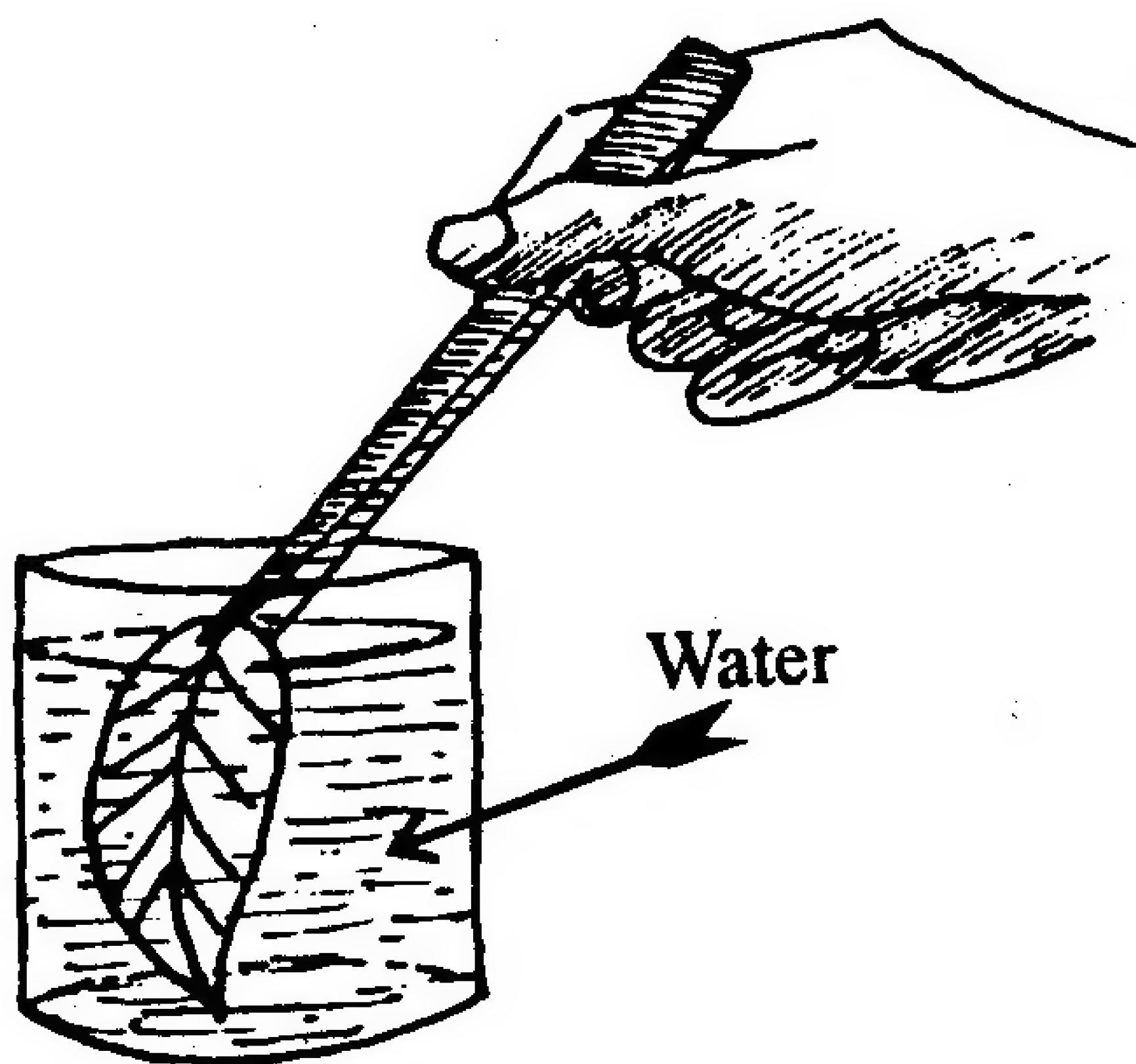
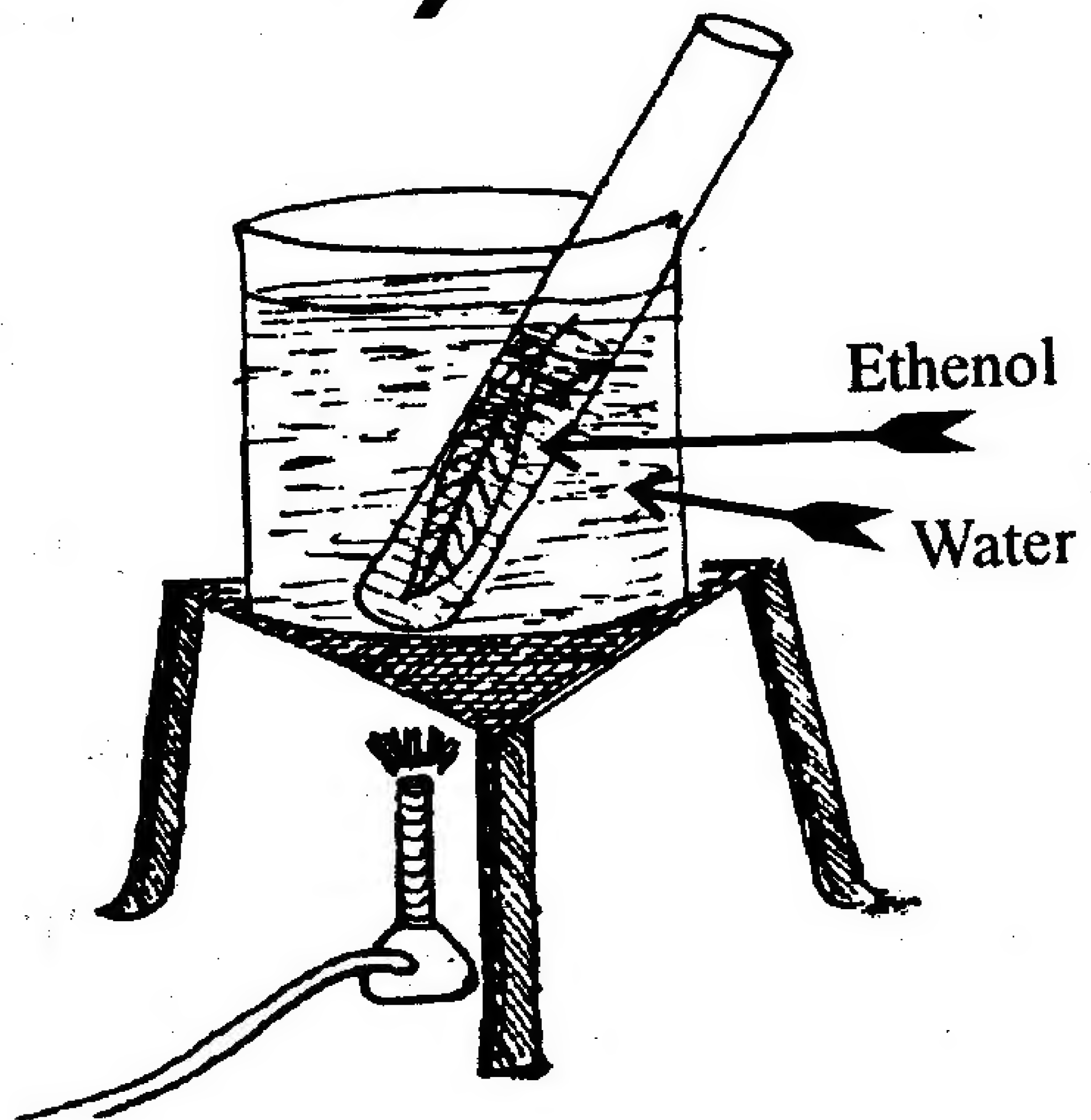
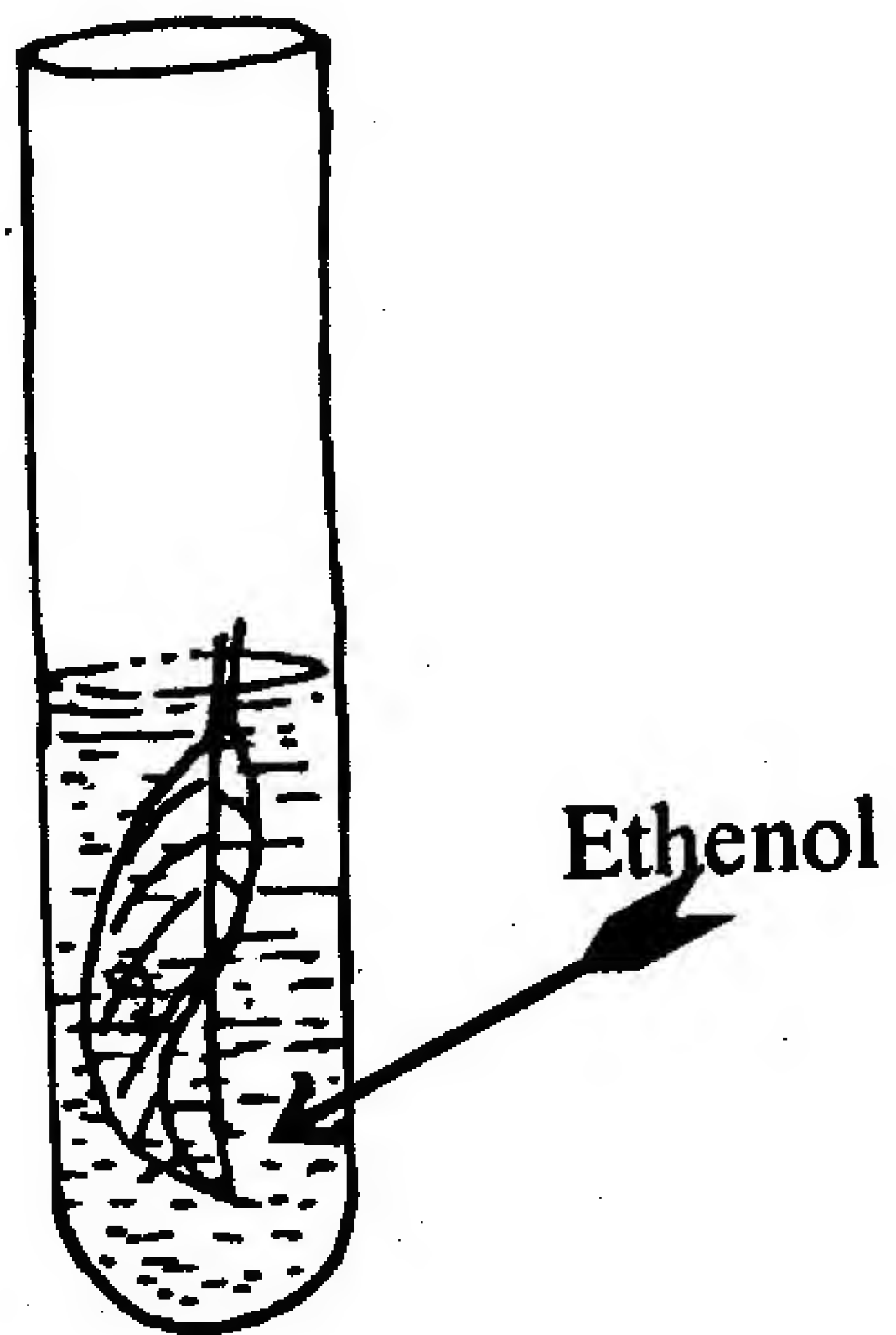
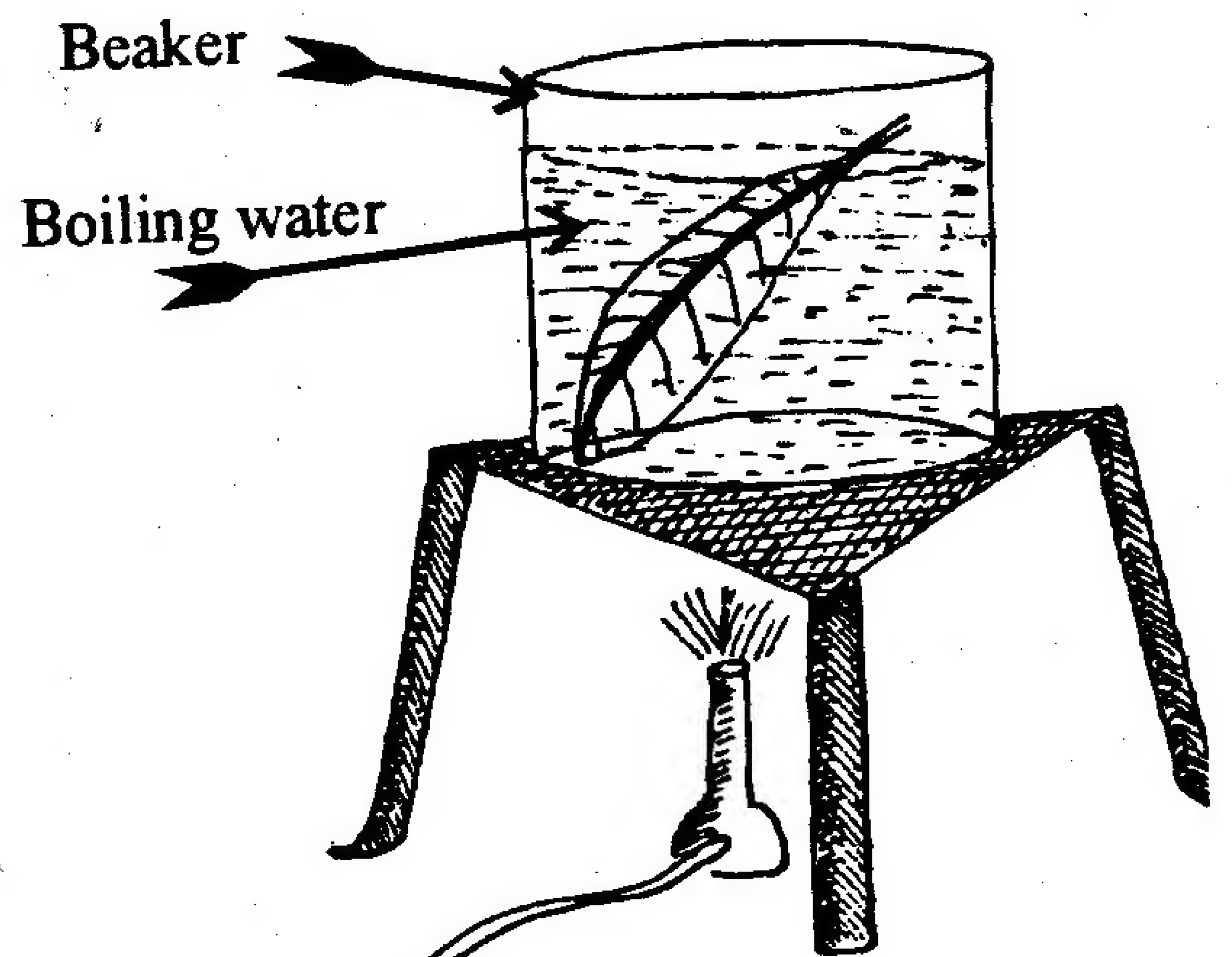
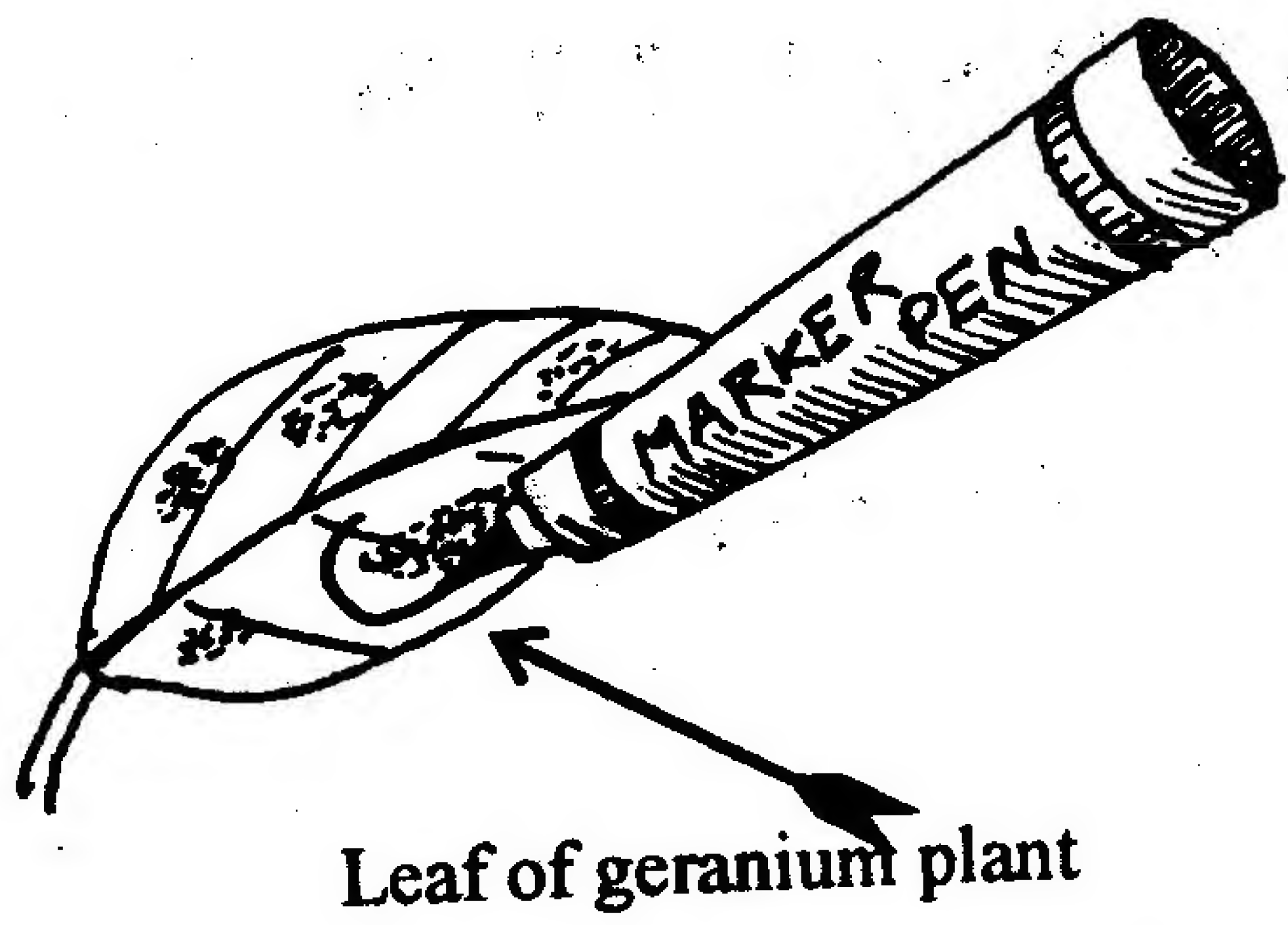
It is hoped that both students and teachers will find the activities interesting.

- The Authors

ACTIVITIES IN LIFE SCIENCES

CONTENTS

1.	Acitivity-1	7
2.	Activity-2	9
3.	Activity-3	11
4.	Activity-4	13
5.	Activity-5	15
6.	Activity-6	17
7.	Activity-7	19
8.	Activity-8	21
9.	Activity-9	23
10.	Activity-10	25
11.	Activity-11	27
12.	Activity-12	29
13.	Activity-13	31



ACTIVITY - 1

Materials	Specifications	Quantity	Remarks
1. Variegated leaf of a geranium plant	-	1	-
2. Marker pen	-	1	-
3. Boiling water	-	-	-
4. Test tube	-	1	-
5. Ethanol	-	20-50 ml	-
6. Water bath	-	1	-
7. Beaker	-	1	-
8. Dish	-	1	-

Instructions

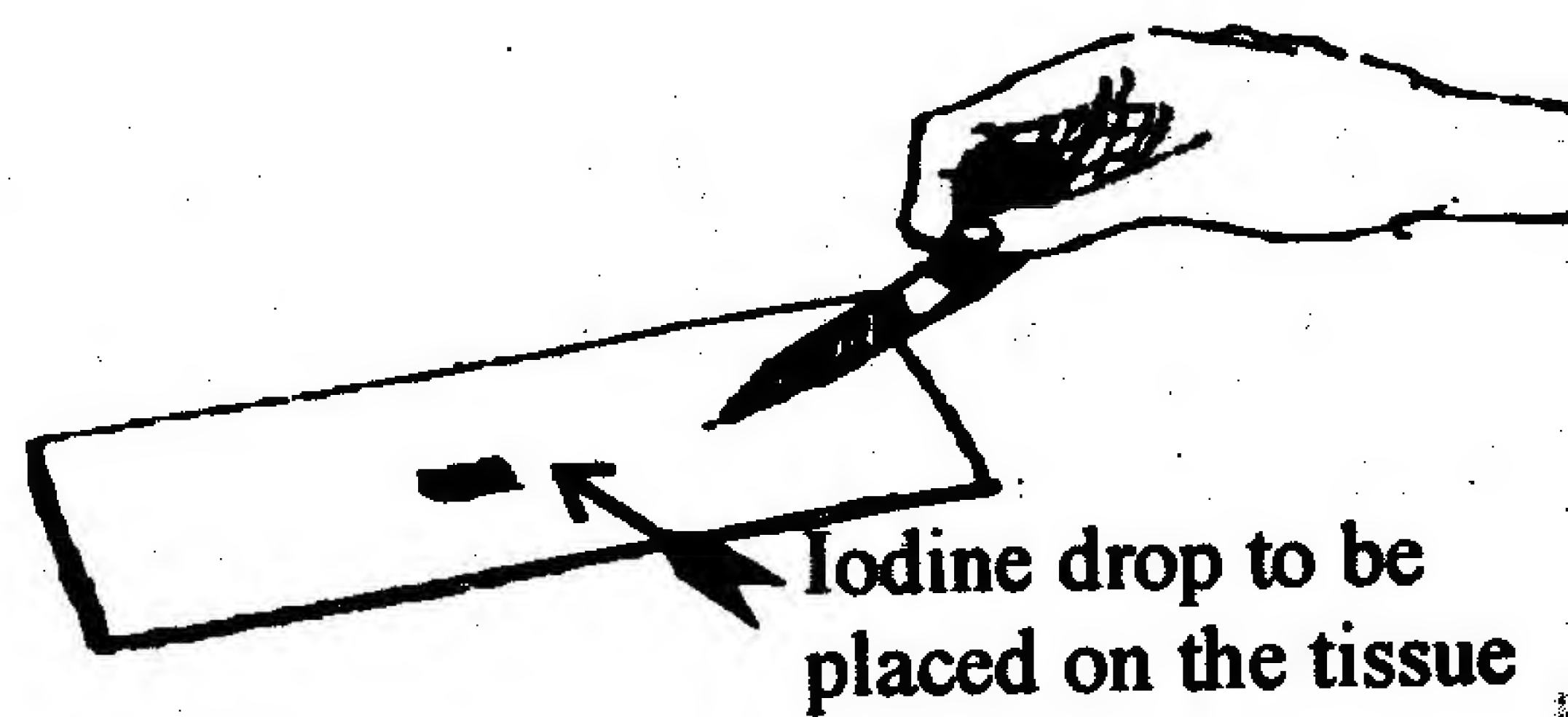
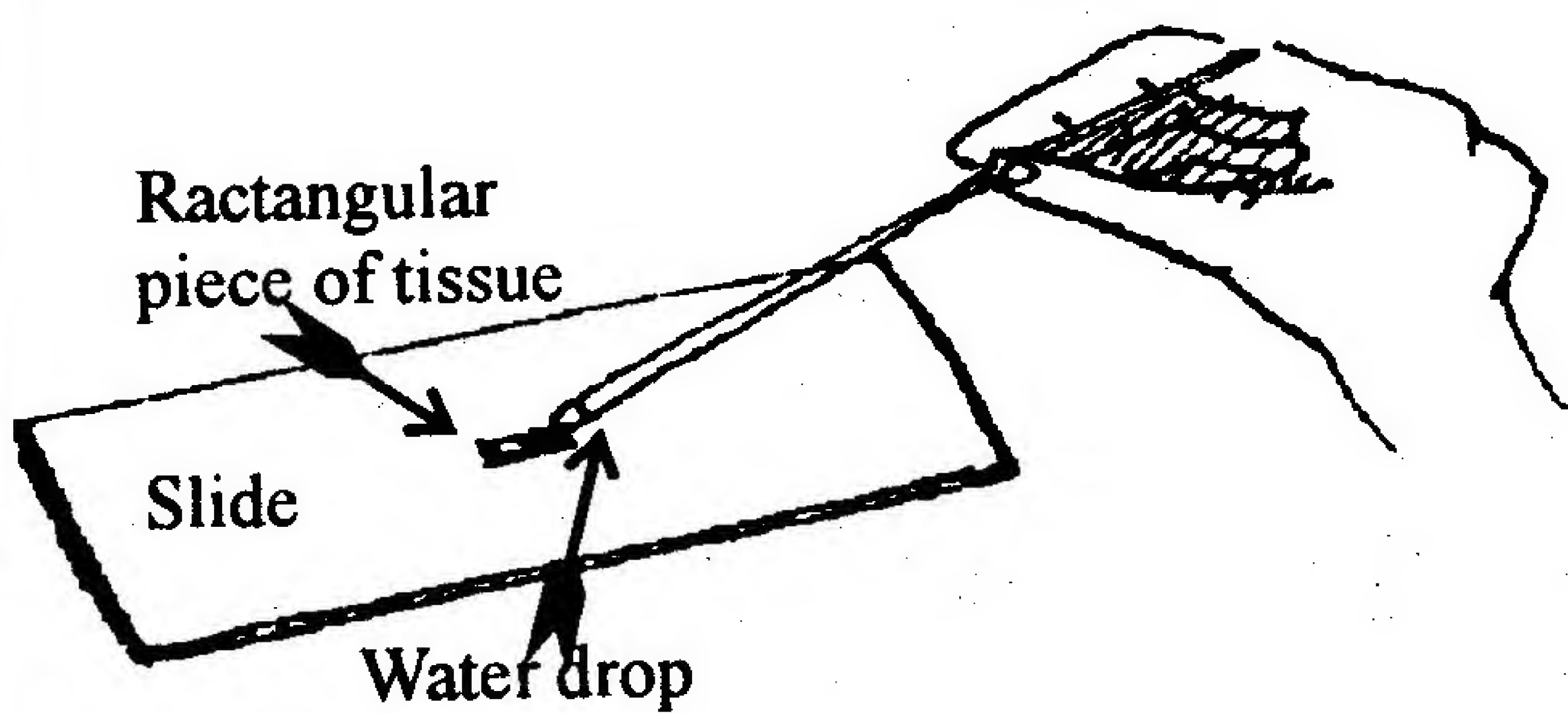
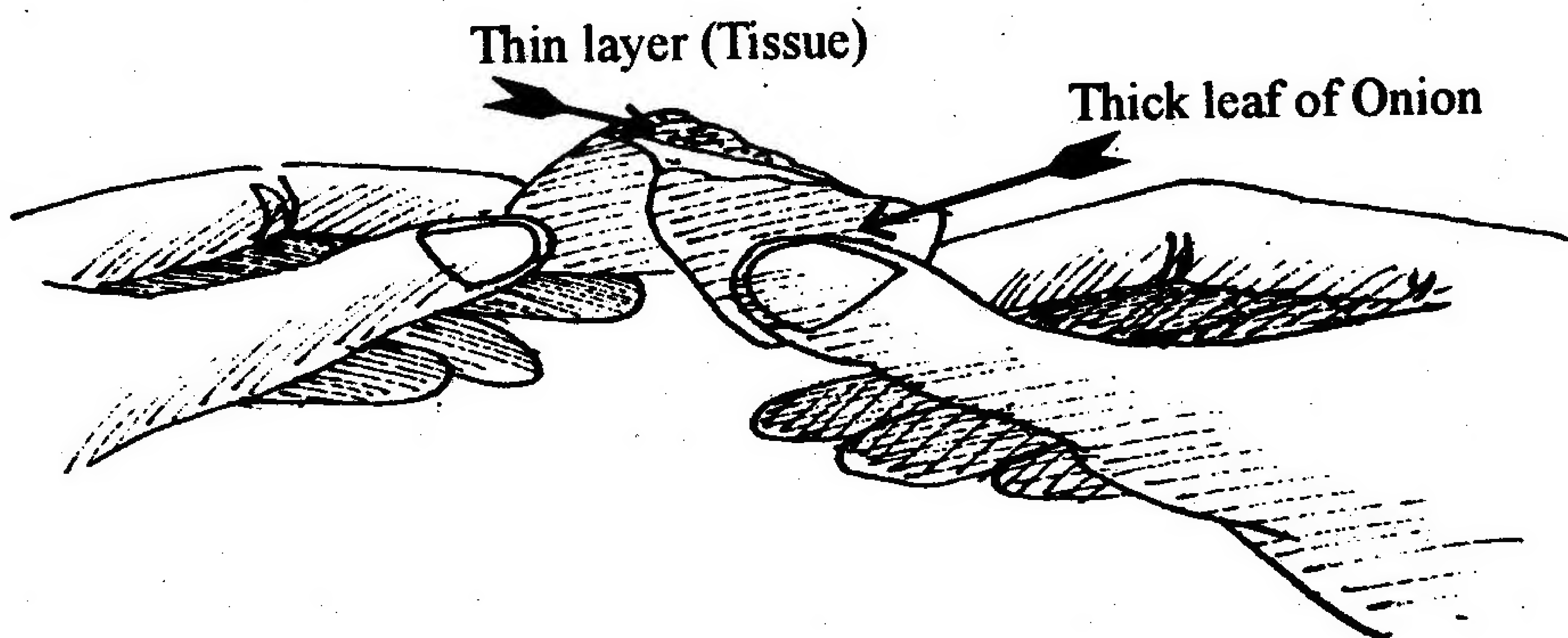
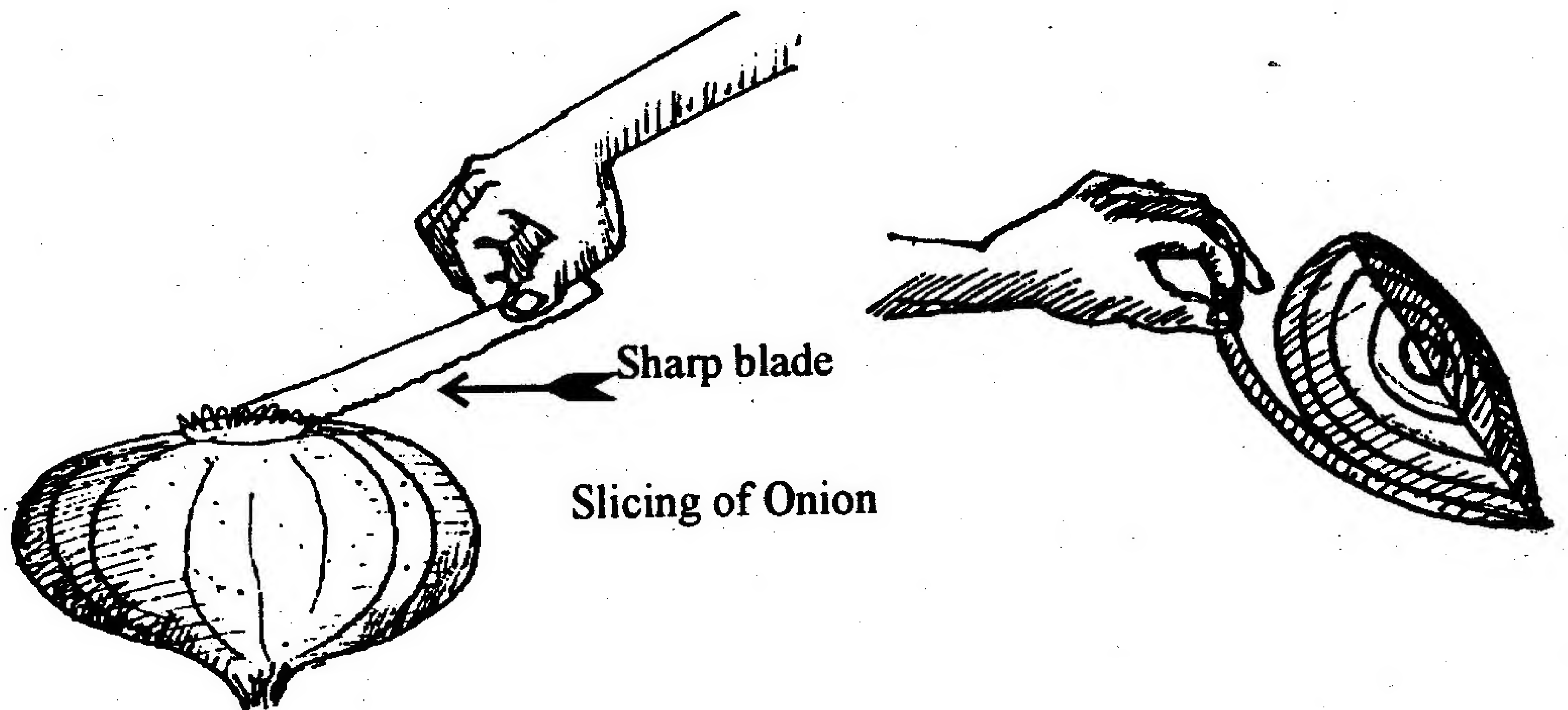
1. Cut off a variegated leaf of a geranium plant.
2. With a marker pen circle the non-green areas on the upper side of the leaf.
3. Dip the leaf in boiling water for half a minute.
4. Put the leaf in a test tube containing ethanol.
5. Stand the test tube in a hot water beaker till it decolorises.
6. Wash the leaf by waving it in a beaker of water
7. Put the leaf in a dish and cover it with dilute iodine solution.

Observations

- a) What happens to the colour of solution in circled and non-circled portions of the leaf?

.....

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ACTIVITY - 2

Materials	Specifications	Qty.	Remarks
1. Onion	-	1	-
2. Blade	-	1	-
3. Concentrated sugar solution	-	2-3 drops	-
4. Slide	-	1	-
5. Cover Slip	-	1	-
6. Filter-paper	-	1	-
7. Dropper	-	1	-

Instructions

1. Take an onion bulb. Cut it into four quarters.
2. Take one of the quarters and from one of the leaves peel off the inner epidermal peel.
3. Cut a small rectangular piece of the peel and place it one drop of water on a slide.
4. Place a cover slip and observe under the low power microscope.
5. Place a drop or two of concentrated sugar solution on one edge of a cover slip and the filter paper on the opposite (see figure).

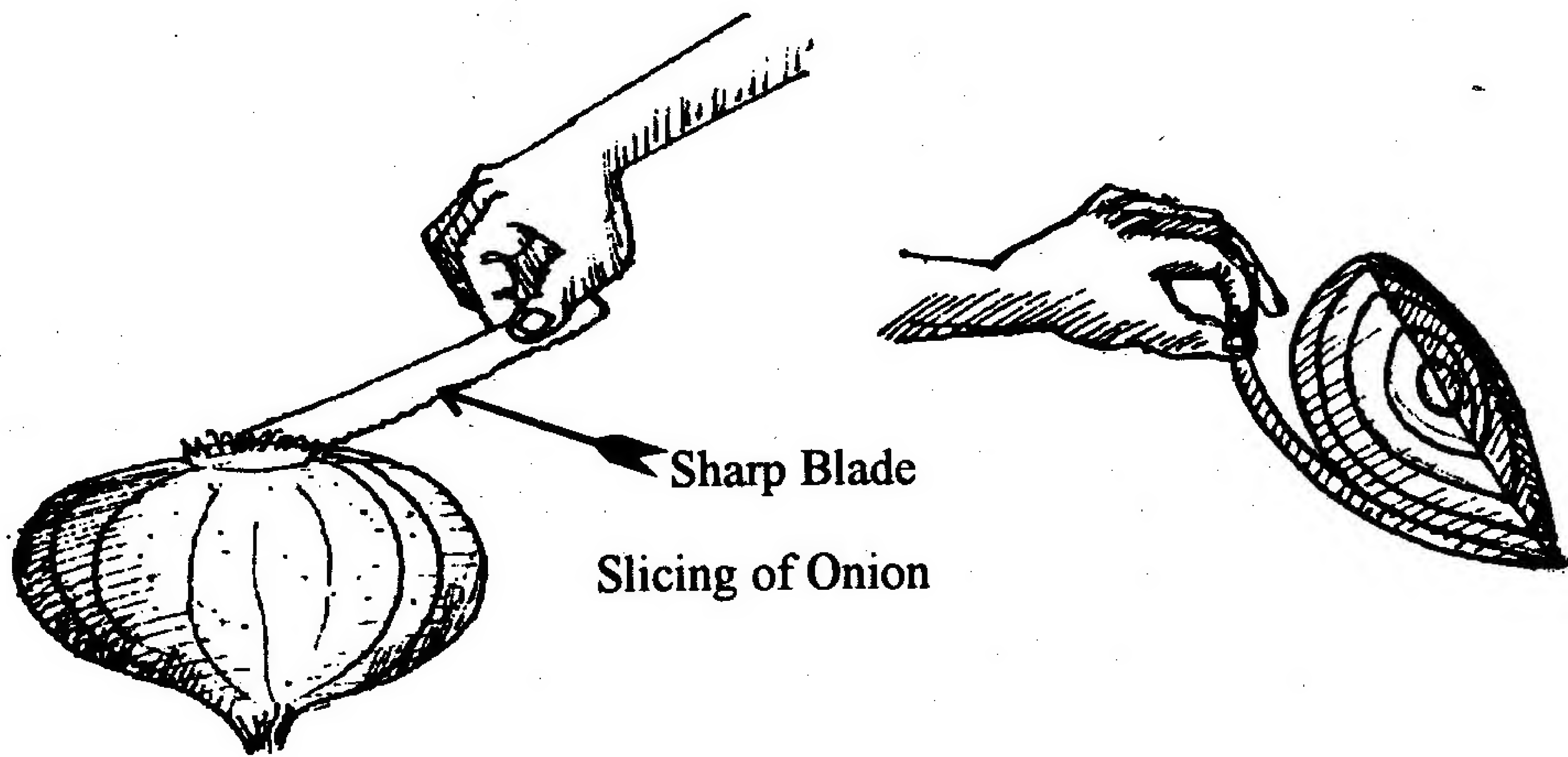
Observations

- a) What do you observe when a drop of concentrated solution is placed on the edge of the coverslip?

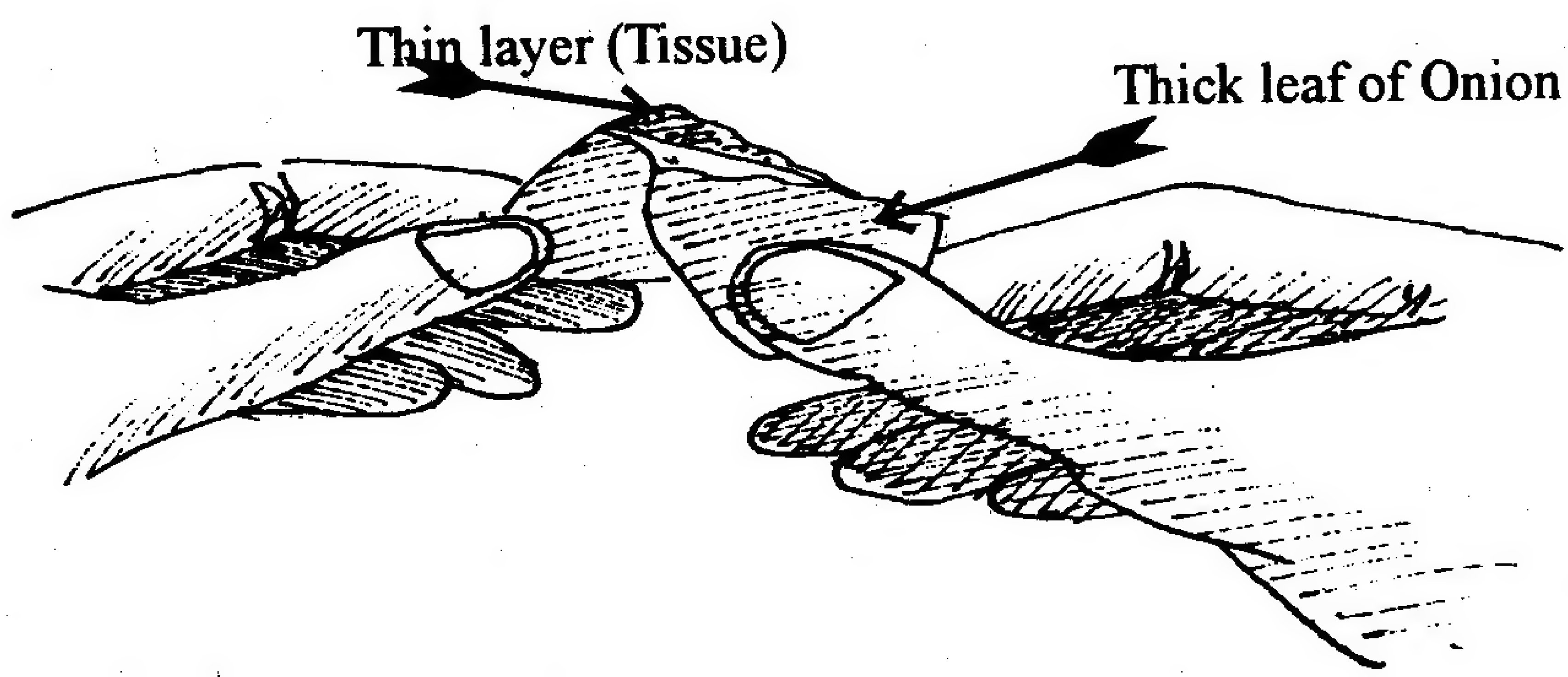
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- b) Why is it so?

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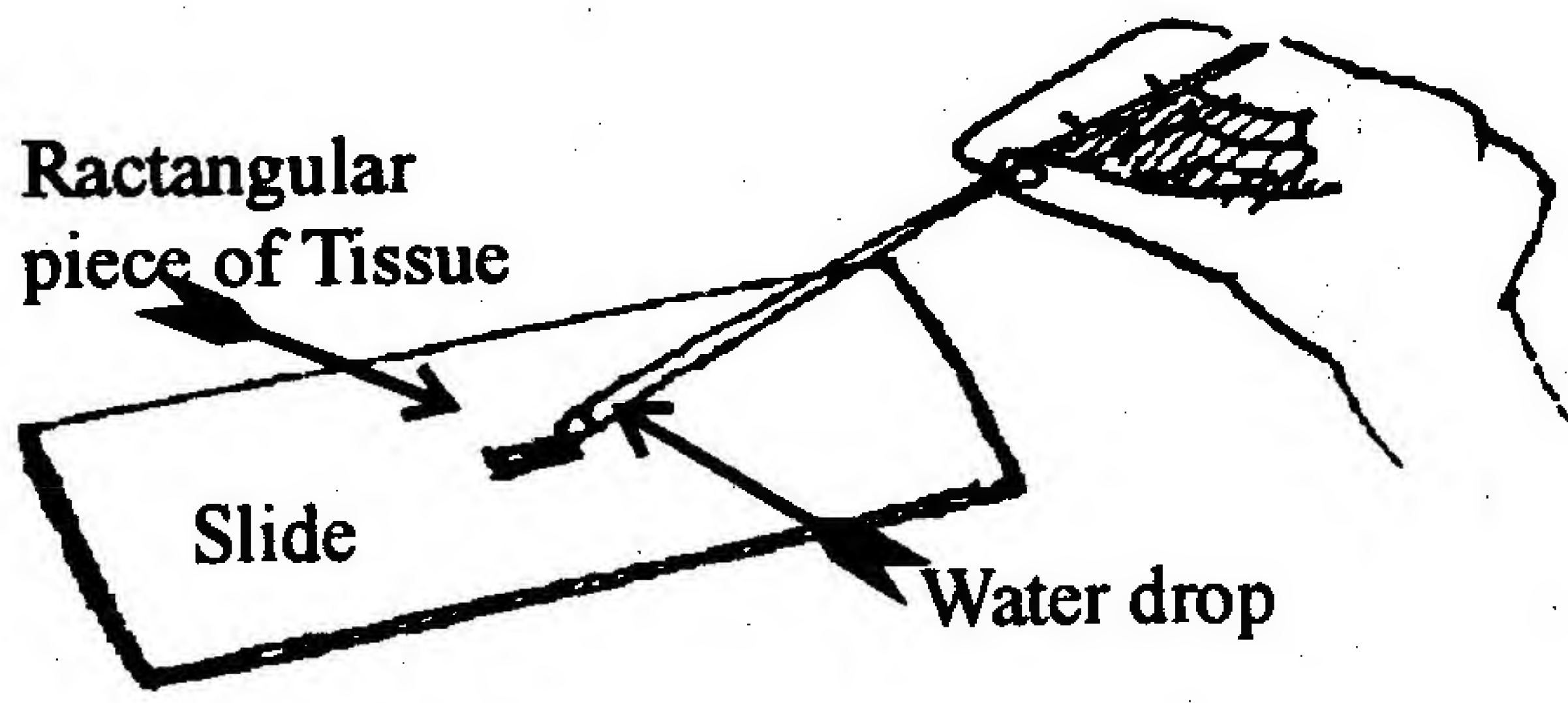


Sharp Blade
Slicing of Onion



Thin layer (Tissue)

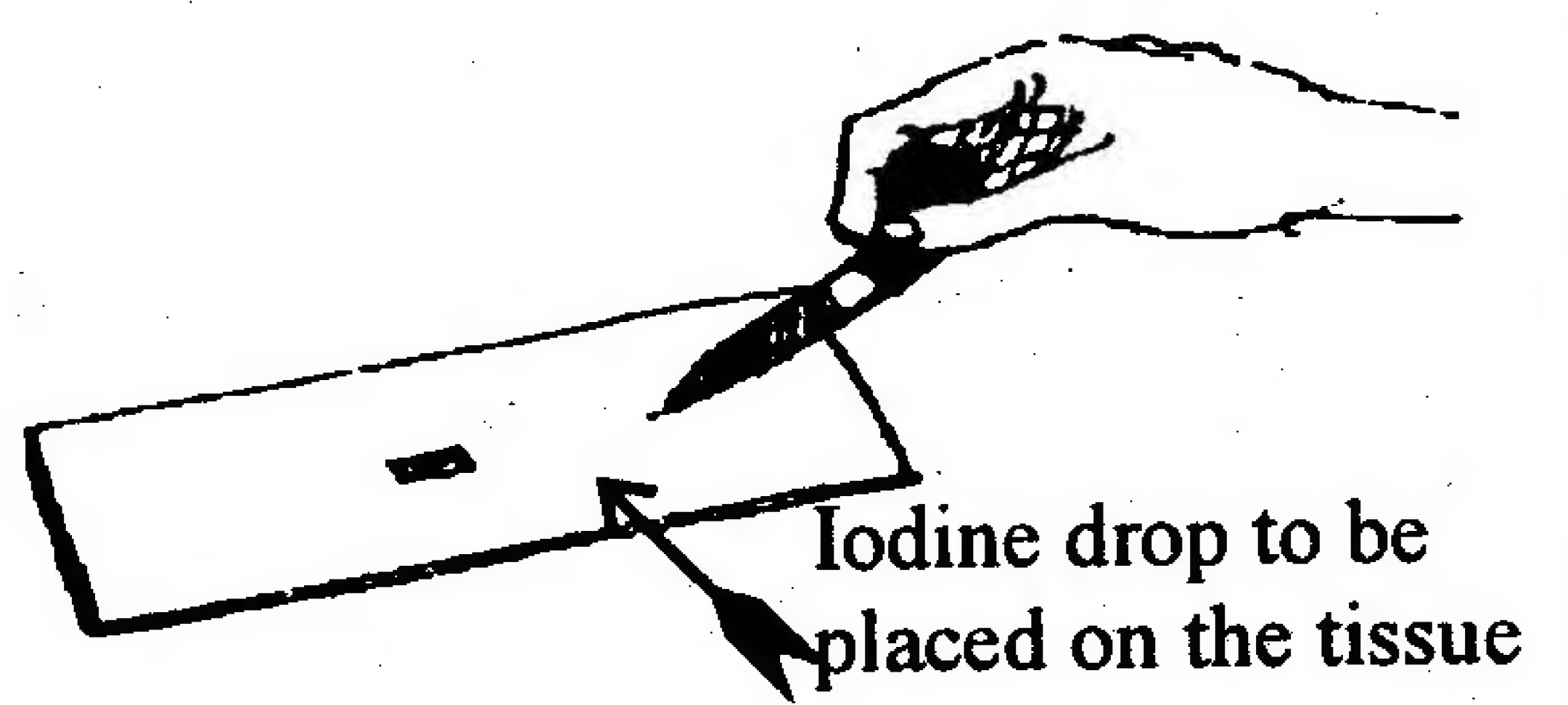
Thick leaf of Onion



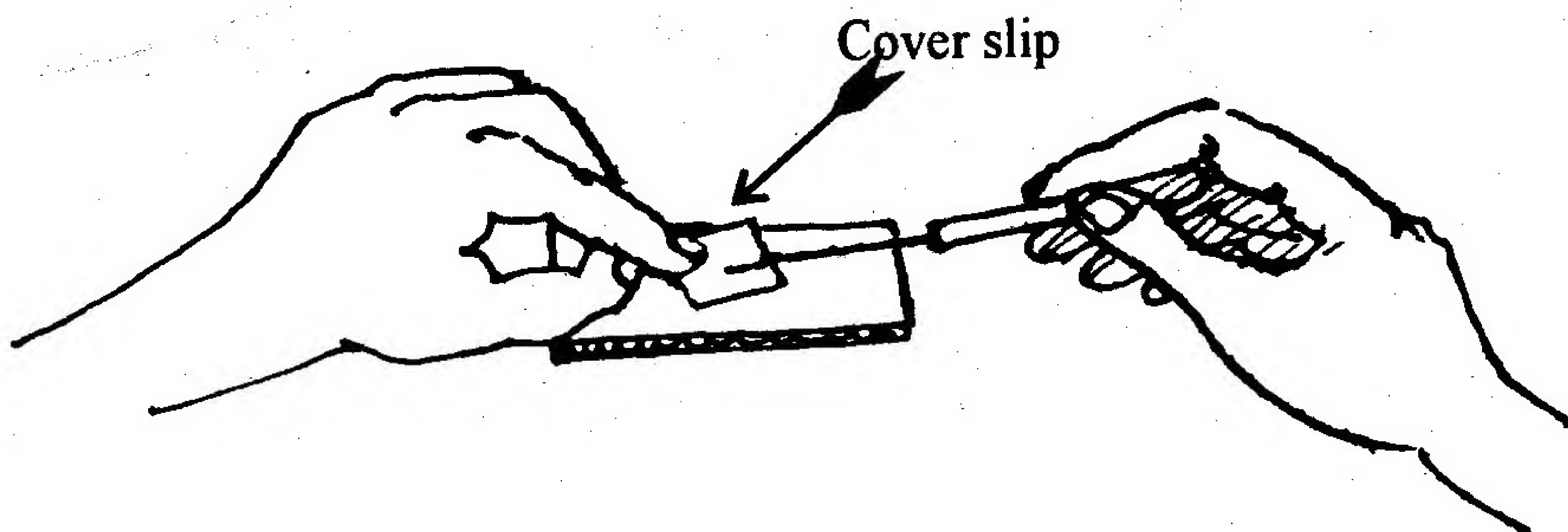
Ractangular
piece of Tissue

Slide

Water drop



Iodine drop to be
placed on the tissue



Cover slip

ACTIVITY - 3

Materials	Specifications	Qty.	Remarks
1. Onion bulb	-	1	-
2. Blade	-	1	Scissors
3. Iodine solution	-	1-2 drops	Tincture of Iodine
4. Slide	-	1	-
5. Coverslip	-	1	-
6. Compound Microscope	-	1	-

Instructions

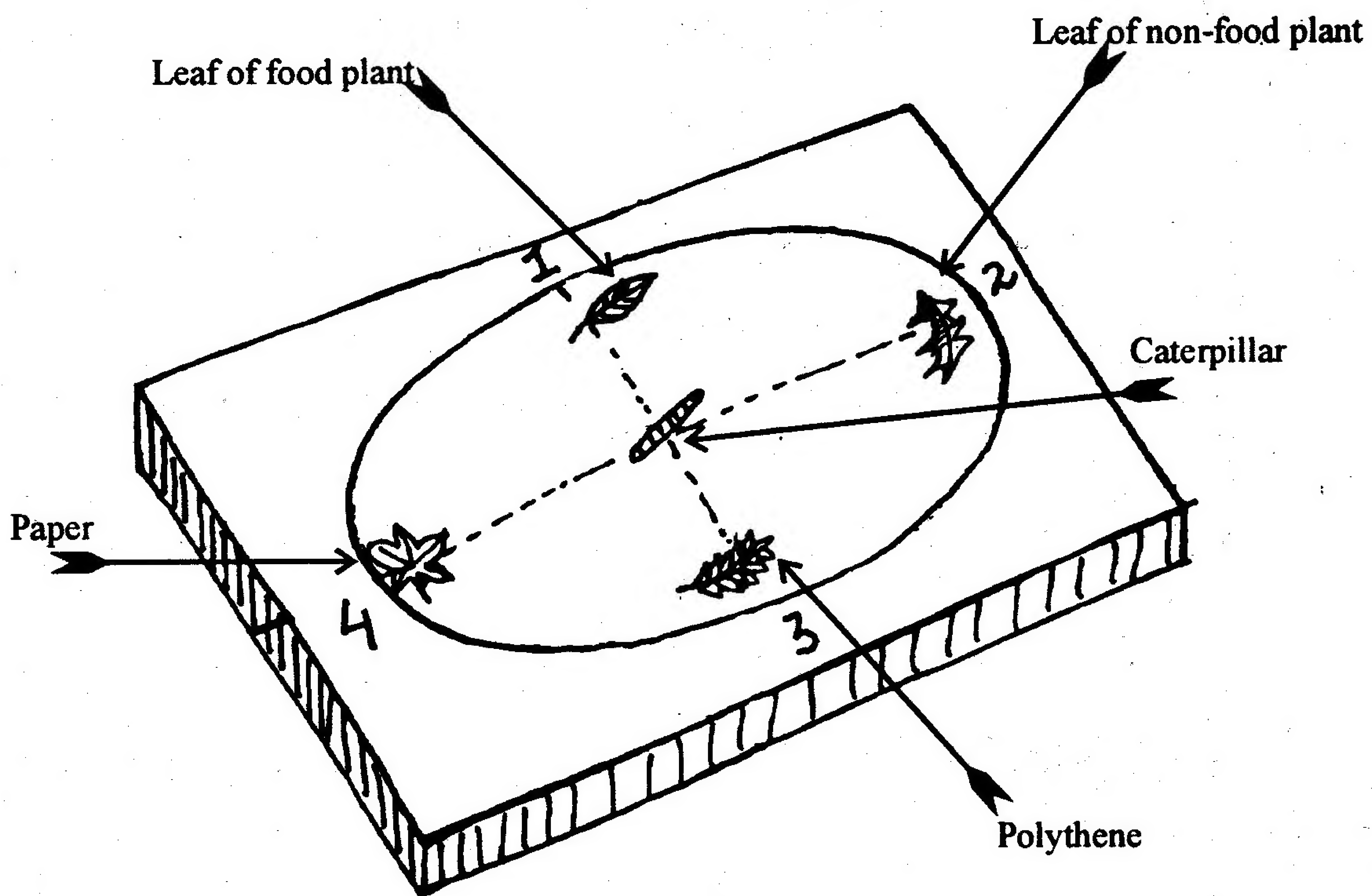
1. Take an onion bulb and slice it lengthways into four quarters.
2. Take out its thick 'leaf' from inside.
3. Fold the 'leaf' towards the concave surface into half, to produce a crease (see figure).
4. Tear the folded portion from the rest of the leaf by pulling it at an angle. A thin papery layer of tissue would be seen.
5. Cut a square/rectangular piece of the tissue.
6. Place a drop of water on a slide and on to this place the cut piece.
7. Place a drop of iodine solution on the piece and put a coverslip above it.
8. Observe first under the low power and then the high power of the microscope.

Observations

- a) What do you observe?

.....

- b) Make a sketch of your observation.



ACTIVITY - 4

Materials	Specification	Qty.	Remarks
1. Caterpillar		One	-
2. Leaf and food plant		One	-
3. Leaf of non-food plant		One each of three different plants	-
4. Paper			

Instructions

1. Take a sheet of paper and make a circle of about 25-30 cm. Draw two diameters perpendicular to one another and intersecting at a point 0.
2. Mark 1,2,3,4 clockwise or anticlockwise, the points where the diameter touches the circle.
3. Place the caterpillar at 0 and the leaf of the food plant at position 1 and each leaf of the non-food plants at position 2, 3 and 4.

Observations

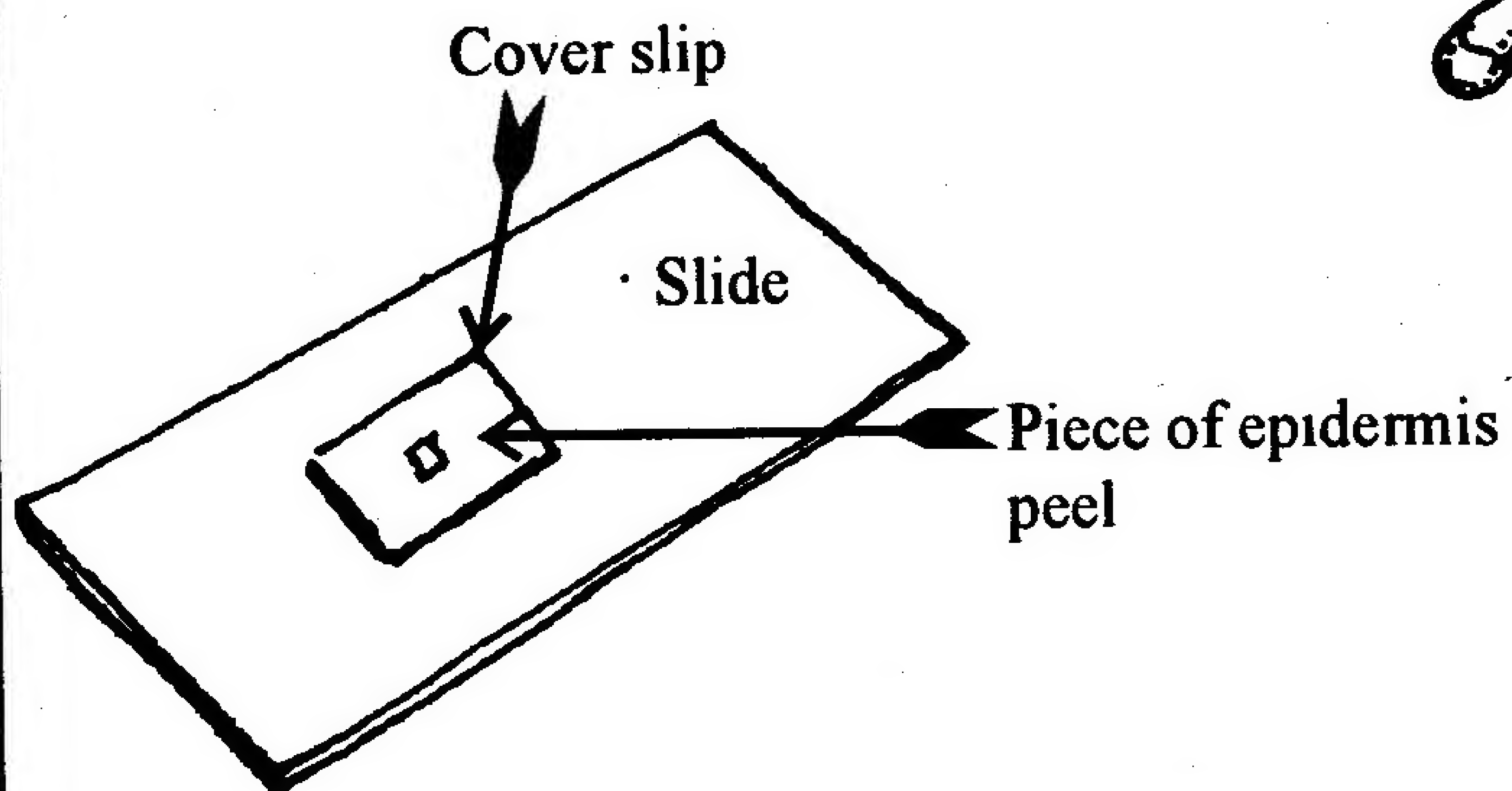
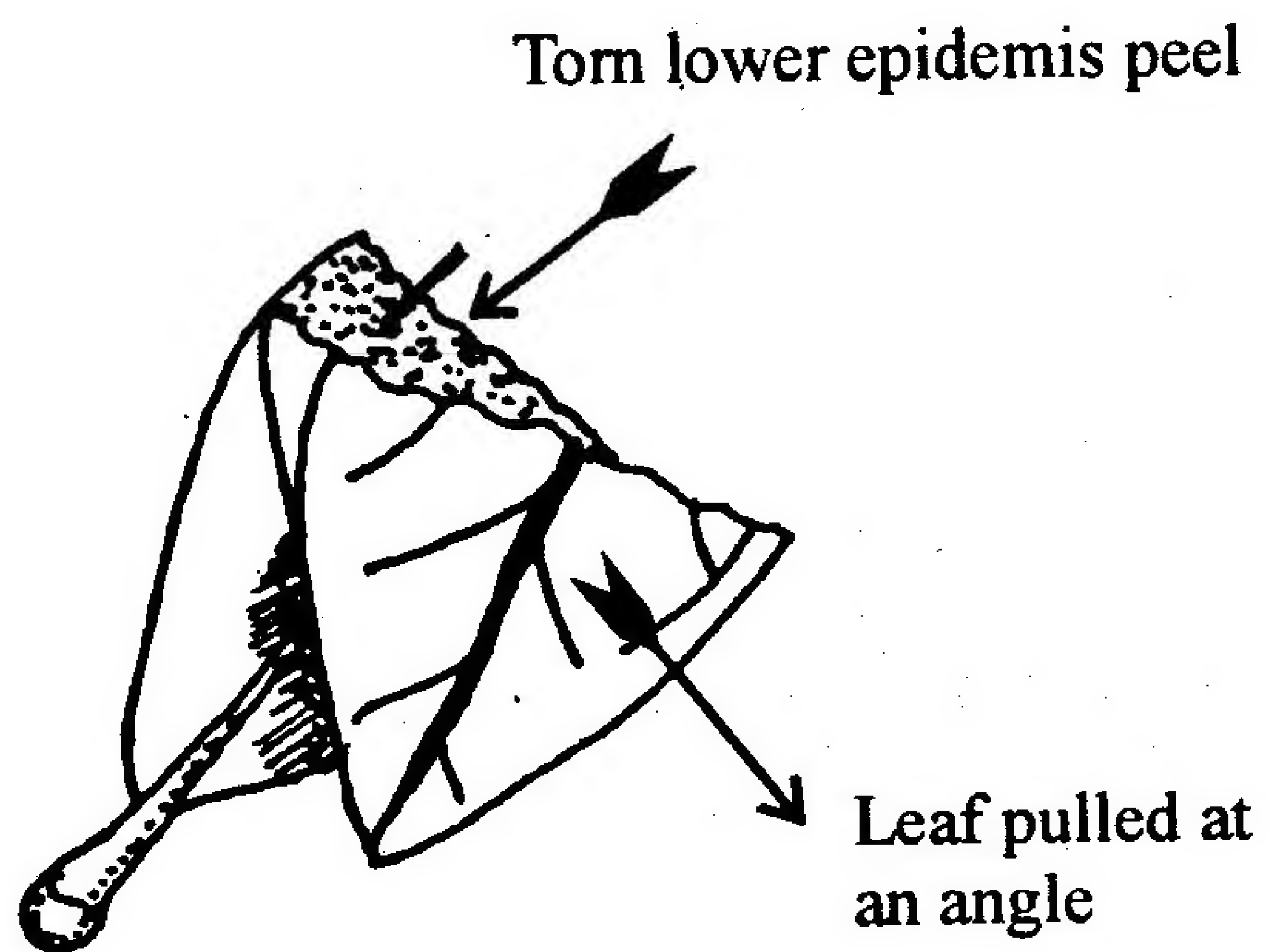
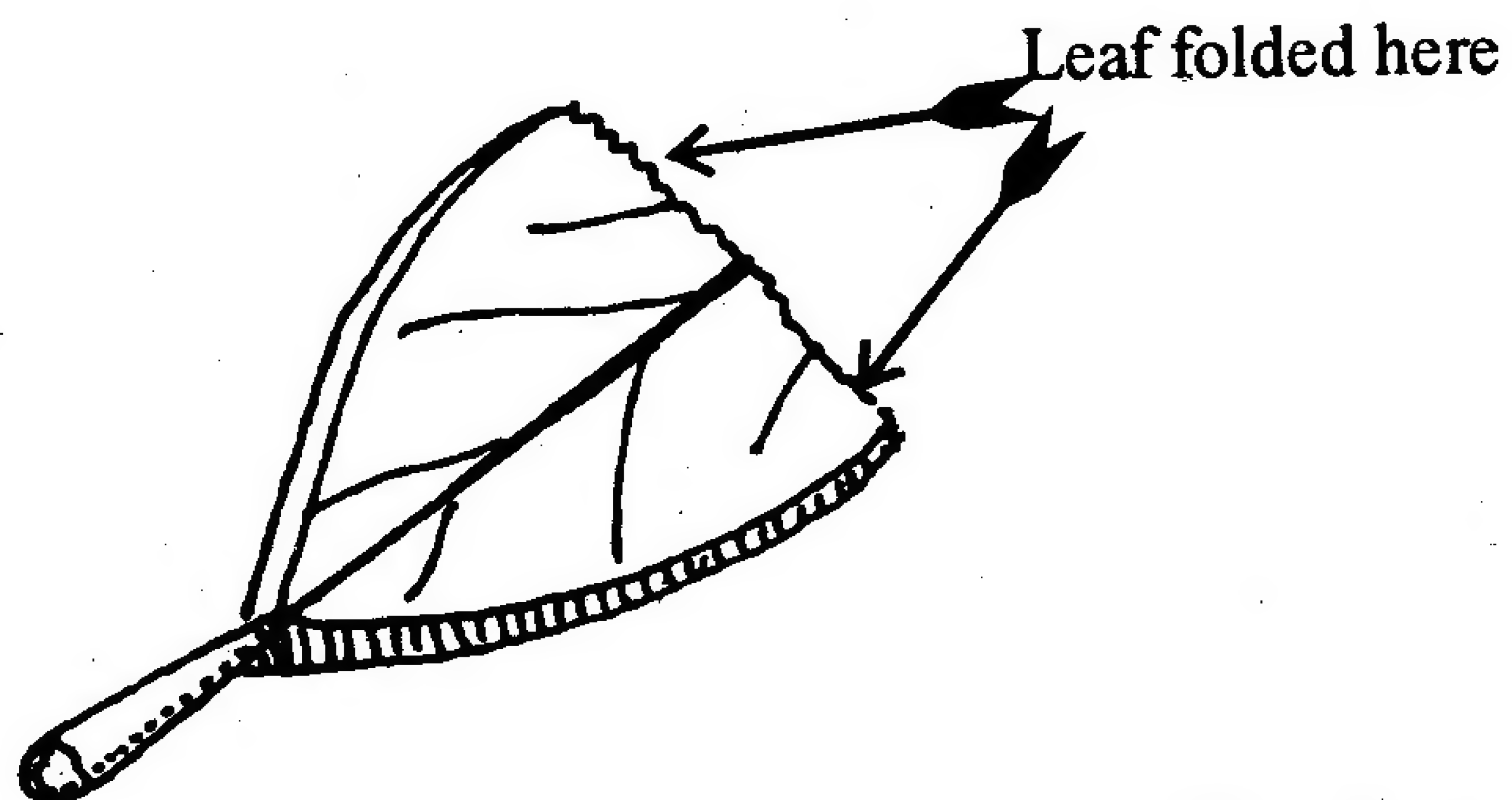
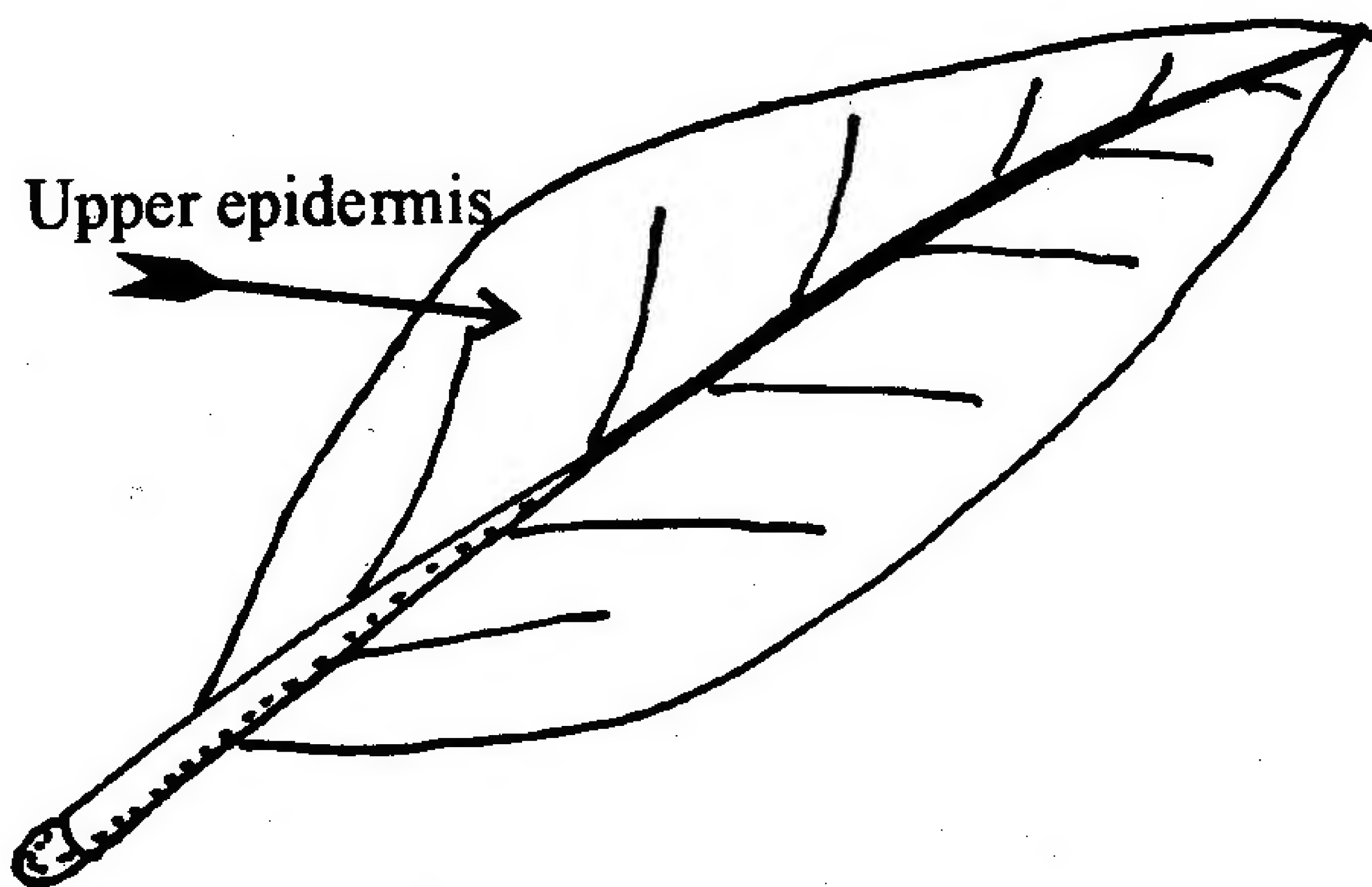
- a) What do you observe?

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Extended Activities

1. Change the position of the leaves, and record your observation.
2. Increase or decrease the diameter of the circle and see what happens.
3. Dry the leaves of the food plant and see what happens.
4. Cut the leaves in identical shapes and see what happens.
5. Orient the points in north-south, east-west directions and repeat the experiment and see if anything happens.



ACTIVITY - 5

Materials	Specifications	Qty.	Remarks
1. Green Leaf	-	1	-
2. Blade	-	1	Scissors
3. Slide	-	1	-
4. Coverslip	-	1	-
5. Compound Microscope	-	1	-

Instructions

1. Detach a leaf from a plant.
2. Fold the leaf halfway to make a crease and pull at an angle to obtain the lower and upper epidermal peels, respectively.
3. Cut a square/rectangular piece of the peel with a blade or scissor.
4. Place the piece on to drop of water on the slide.
5. Place a coverslip and observe first under the low and then under the high power of the microscope, for each of the lower and upper epidermal peel.

Observations

- a) Make a diagram of the observation you make under the low and high power of the microscope.

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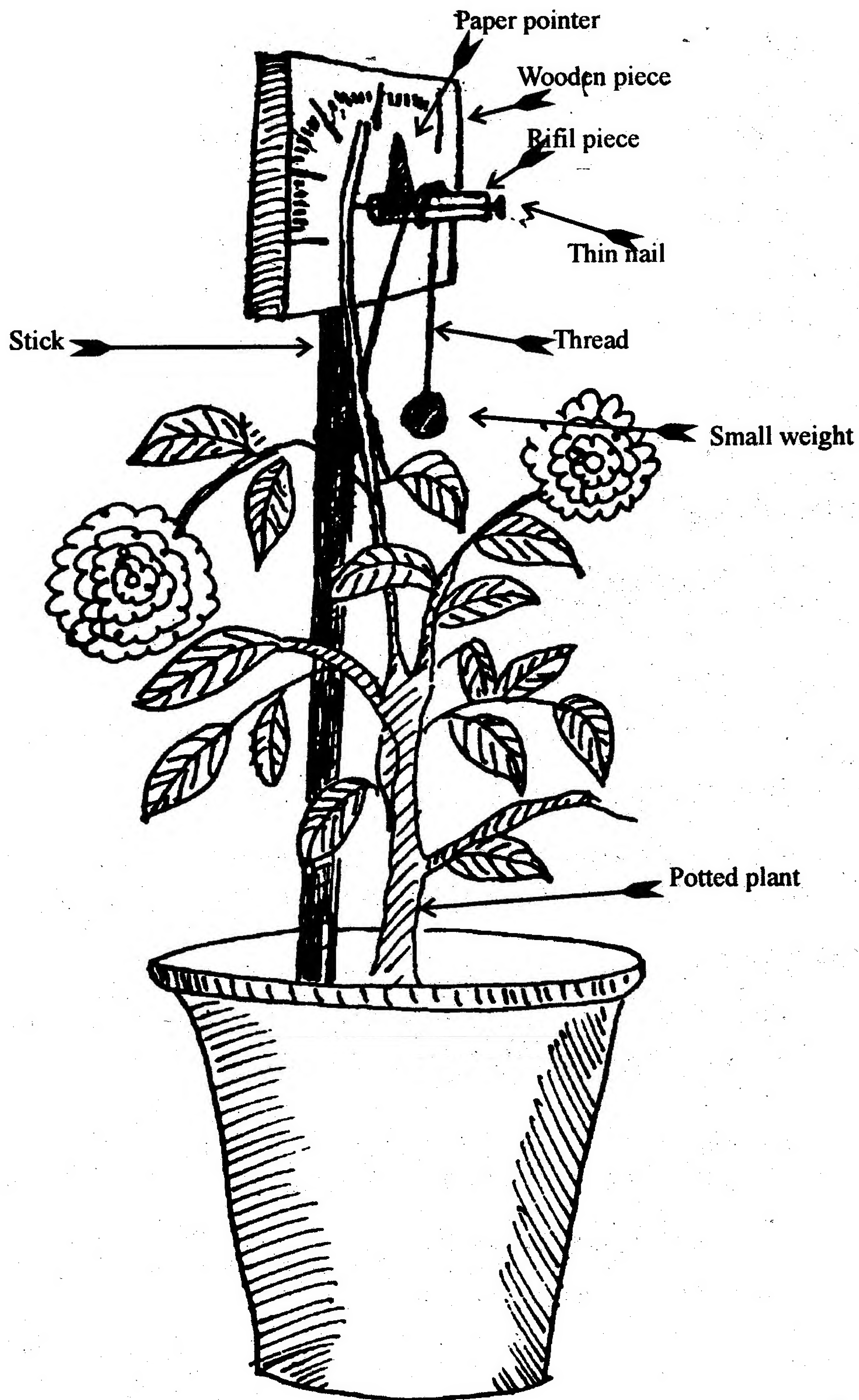
- b) Compare your observation of the lower and upper epidermal peels.

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- c) What conclusions can you draw?

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ACTIVITY - 6

Materials	Specifications	Qty.	Remarks
1. Potted plant	Plants/plant stage which show rapid apical growth	One	Seedlings of gram/bean
2. Thread	0.5 m - 1 m	One	Thick
3. Pin	-	One	Thin nail which can easily pass through refill piece.
4. Ball-point refill	0.5 m - 1 mm	One	-
5. Cardboard		One	Hardboard or Note-book cover
6. Wooden rod	Stout and strong and approximately equal to the height of the plant	One	Should be able to bear the weight of the cardboard.
7. Suitable mass (Body)	-	One	A small nut or a eraser piece.

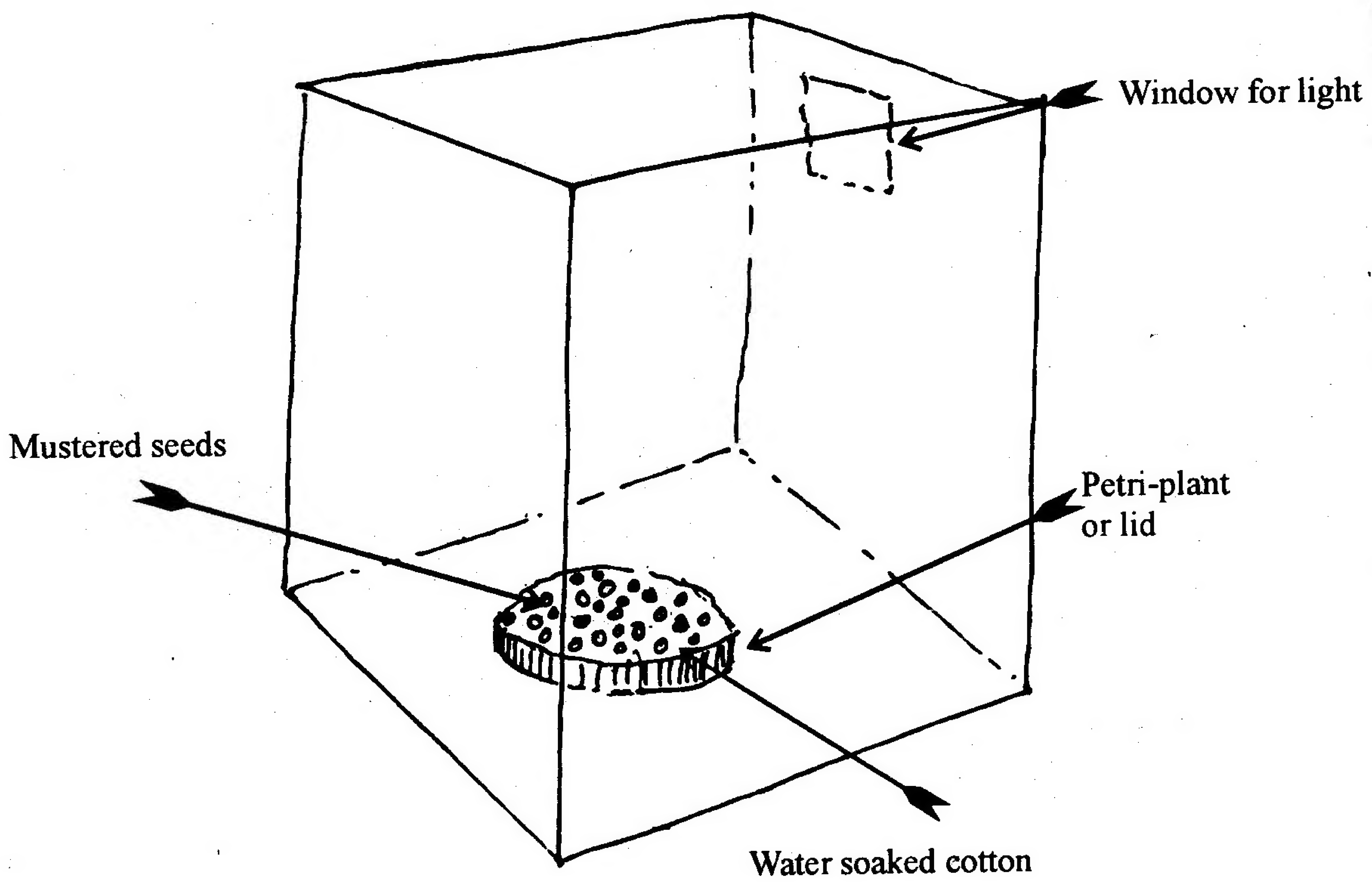
Instructions

1. Take a potted plant and fix the wooden rod at about 8-10 cm behind the plant with the affixed cardboard at the top facing the plant.
2. On the cardboard at about the centre fix a ball-point refill piece through which a pin passes. The refill piece should show free movement.
3. Tie one end of the thread to or near the plant and the other end an appropriate weight.
4. Wind one turn of the thread around the refill piece.
5. Cut an hard paper in the shape of an arrow mark and insert the base in the ball point-refil.
6. Mark the initial position of the arrow-mark on the cardboard and keep recording its positions after regular intervals (in days).

Observation

What do you observe?

.....



ACTIVITY - 7

Materials	Specifications	Qty.	Remarks
1. Cardboard Box	5 cm x 5 cm x10 cm dimension	1	Any small or medium sized box Empty boot polish lid.
2. Petrilplate or lid	-	1	Filter paper
3. Cotton	-	-	News paper
4. Mustard seeds	viable	20-25	-

Instructions

1. Cut out a small window on one upper face of the box.
2. Moisten the filter paper/newspaper, cut as per the area of the polish lid, and it spread on a thin layer of cotton and sprinkle some water on it.
3. Spread around 20-25 presoaked seeds of mustard evenly on the cotton/filter paper.
4. Place the lid in the box and see that light enters only through the window.
5. Observe after 3-4 days.

Observation

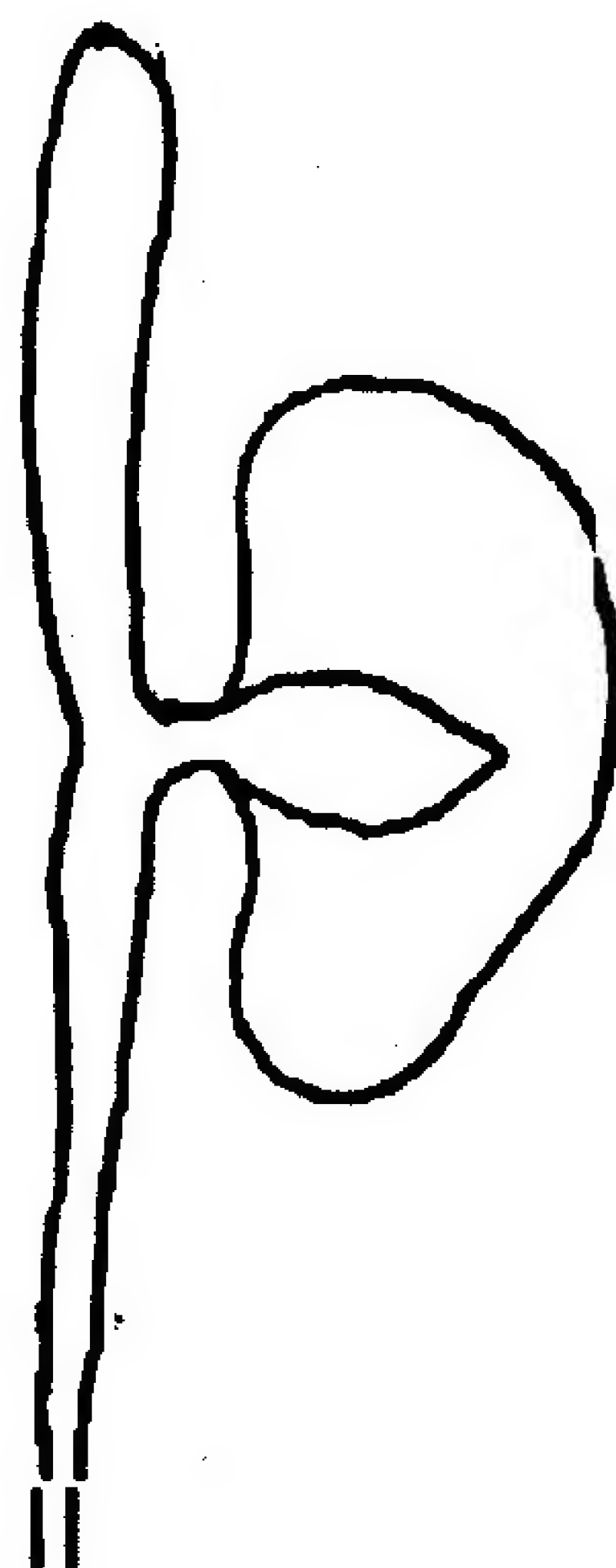
What do you observe?

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Extended activity

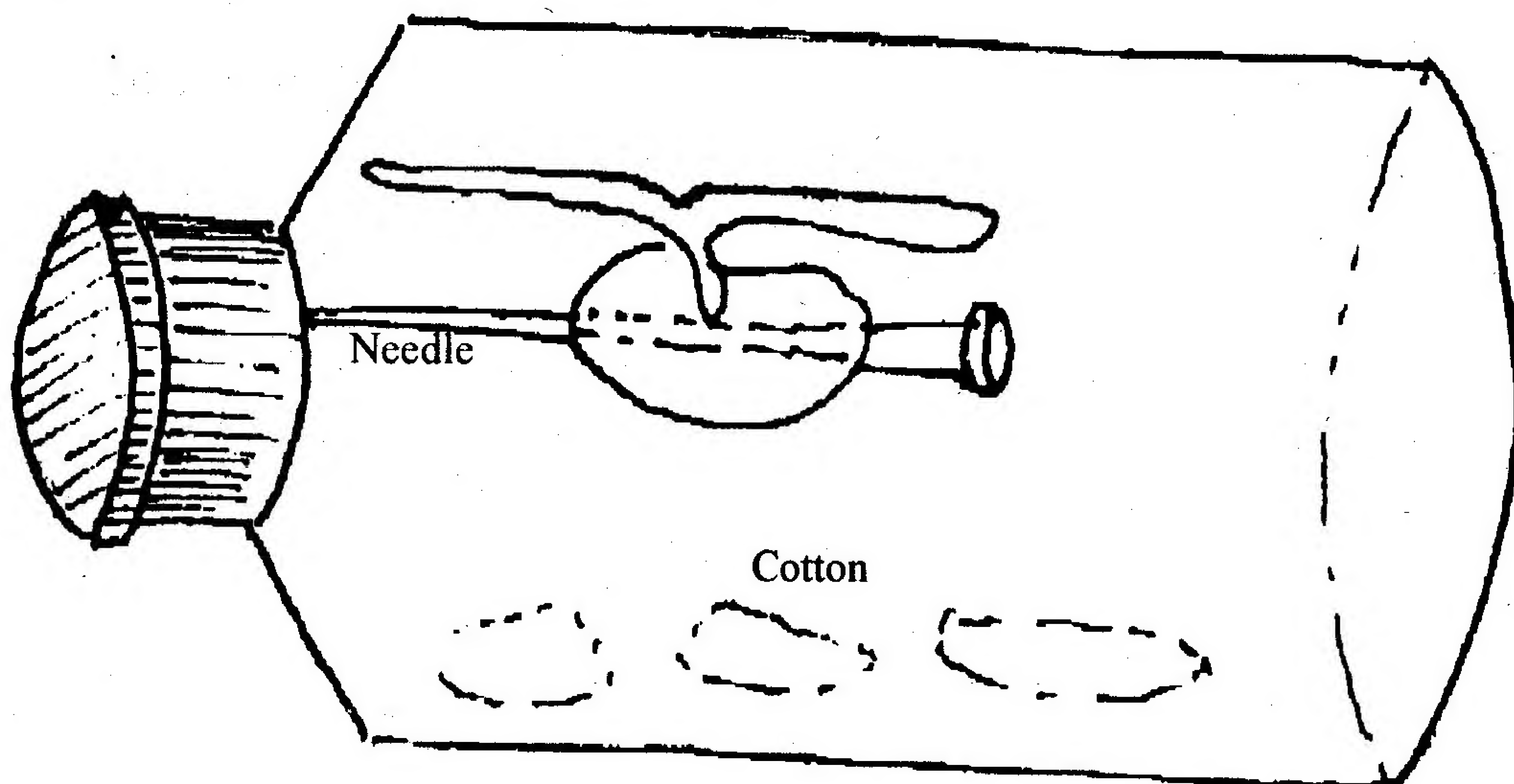
- a) Cut out a similar-sized window on the opposite face and chose the farmer one. Record your observation/what conclusion do you draw?

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Germinated
Seed

Bottle



ACTIVITY - 8

Materials	Specification	Qty.	Remarks
Bottle	Glass	1	-
Cork	-	1	-
Long Pin	-	1	Need and a tap could be used.
Germinated Seed	Rapidly growing ones for example: oats, radish or mustard seeds	2	-
Blotting paper	-	-	Cotton

Instructions

- Select one sprouted straight seed.
- Pierce the seed with a long pin or needle and stick this into a cork.
- Place some cotton or blotting paper in a bottle.
- Fix the cork into the mouth of the bottle with the seedling inside (see diagram)
- Place the bottle in a dark cupboard and observe the bottle after every 4 hours.

Observations

What do you observe?

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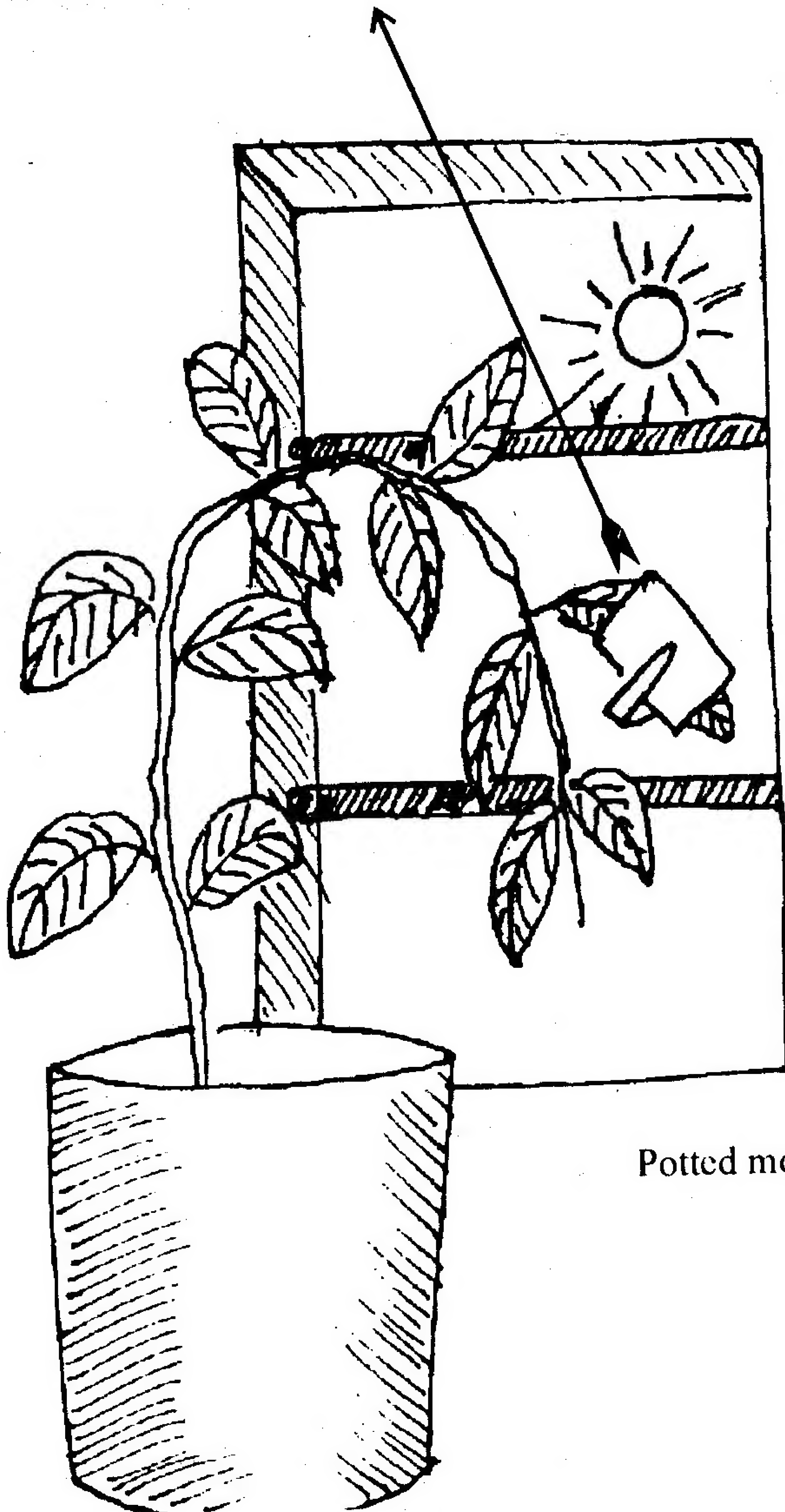
Extended Activity

- Rotate the bottle by 90° after every four hours and record your observation.

Black paper piece

Leaf

Paper clip



Potted money plant

ACTIVITY - 9

Materials	Specification	Qty.	Remarks
1. Potted money plant	-	1	-
2. Black paper strip	-	1	-
3. Gems Clips	-	4	-

Instructions

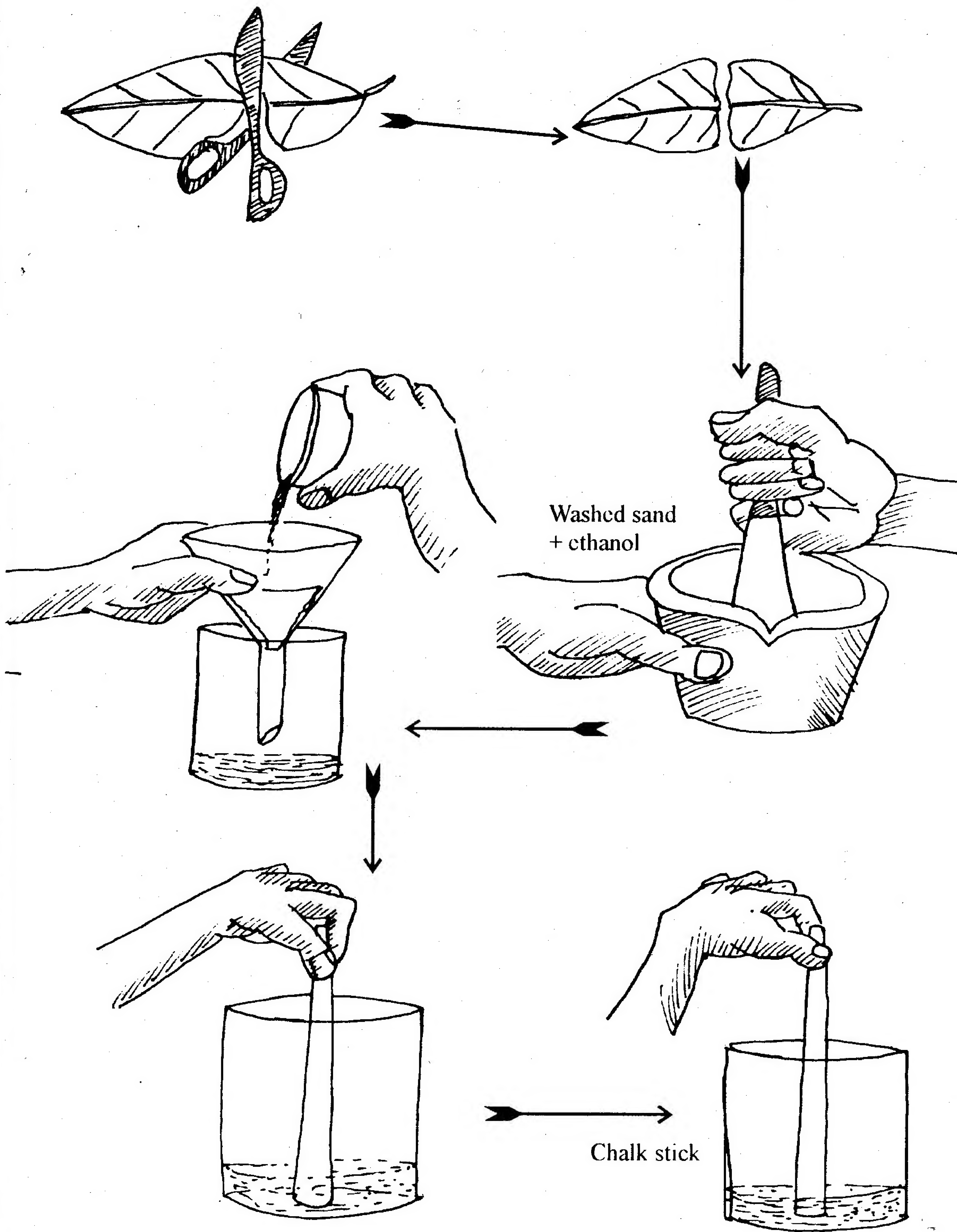
1. Take a potted money plant.
2. Cover one of its leaves by attaching a black paper strip to the upper and lower sides of the leaf with gem-clips.
3. Put the plant in a well-lit place for 3 days.
4. Take off the paper strips.

Observations

- a) What do you observe on the leaf where it was covered with the black paper?
- b) Perform the starch test on this leaf and report your conclusion.

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ACTIVITY - 10

Materials	Specification	Qty.	Remarks
1. Green leaves	Small pieces	1-2	-
2. Mortar and pestle	-	1	-
3. Sand	-	Small qty.	-
4. Ethanol/Acetone	-	25-50 ml	-
5. Chalk Stick	-	1	-
6. Beaker	-	1	-

Instructions

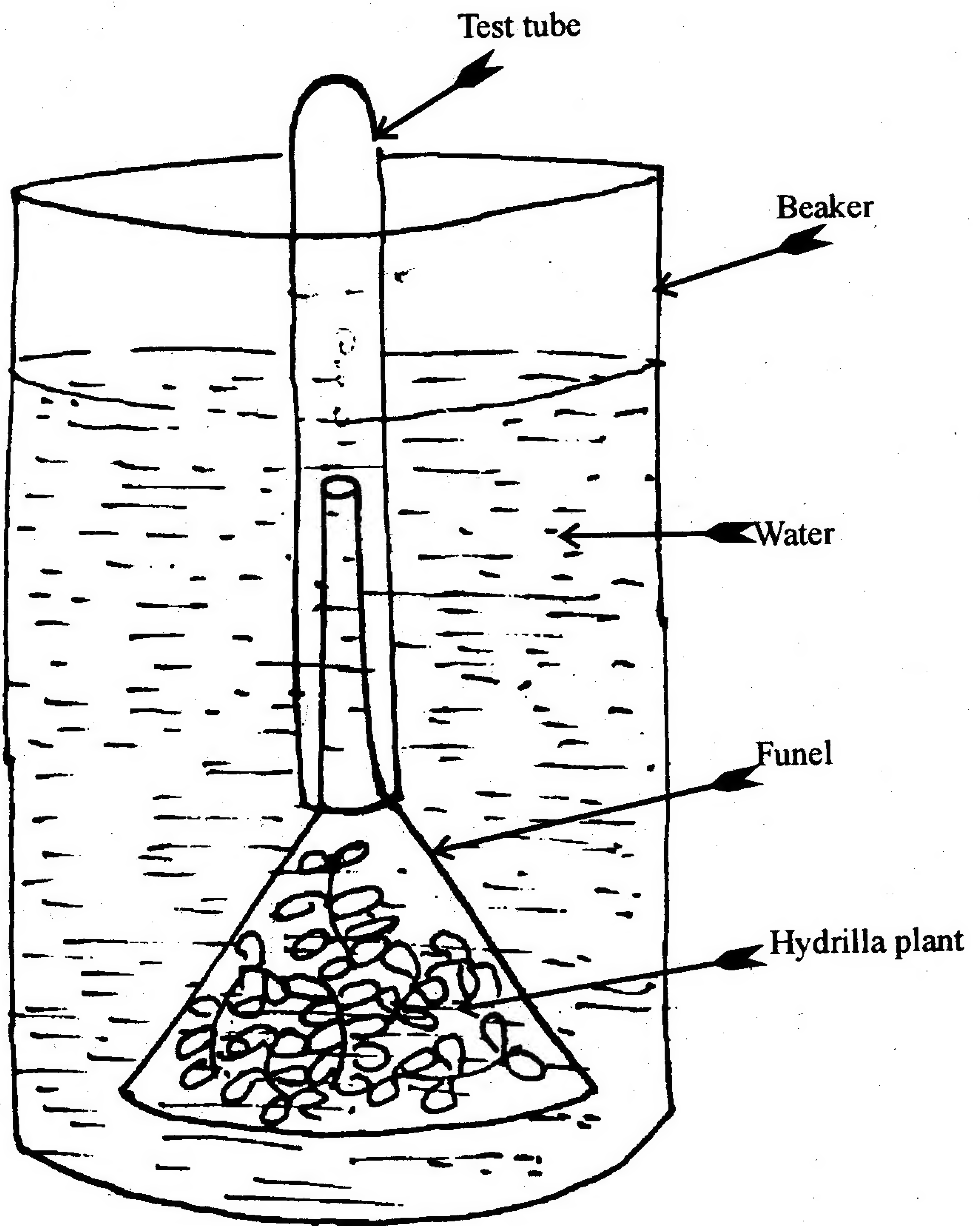
1. Cut up a few green leaves into small pieces.
2. Put the leaf pieces in a mortar with a pinch or two of washed sand.
3. Cover the pieces with ethanol/acetone and grind them with a pestle.
4. Filter the content and dilute it with water.
5. Dip a chalk stick into the solution to make the lower portion of it thoroughly green.
6. Stand the piece of chalk with its green in ethanol/acetone in a beaker.

Observations

- a) What happens to the chalk piece after sometime.
- b) How many colours are separated from the leaf pigment?

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ACTIVITY - 11

Materials	Specification	Qty.	Remarks
1. Hydrilla Plant	-	-	Water weed (Alternative)
2. Funnel	-	1	-
3. Test tube	-	1	-
4. Glowing splint	-	1	-

Instructions

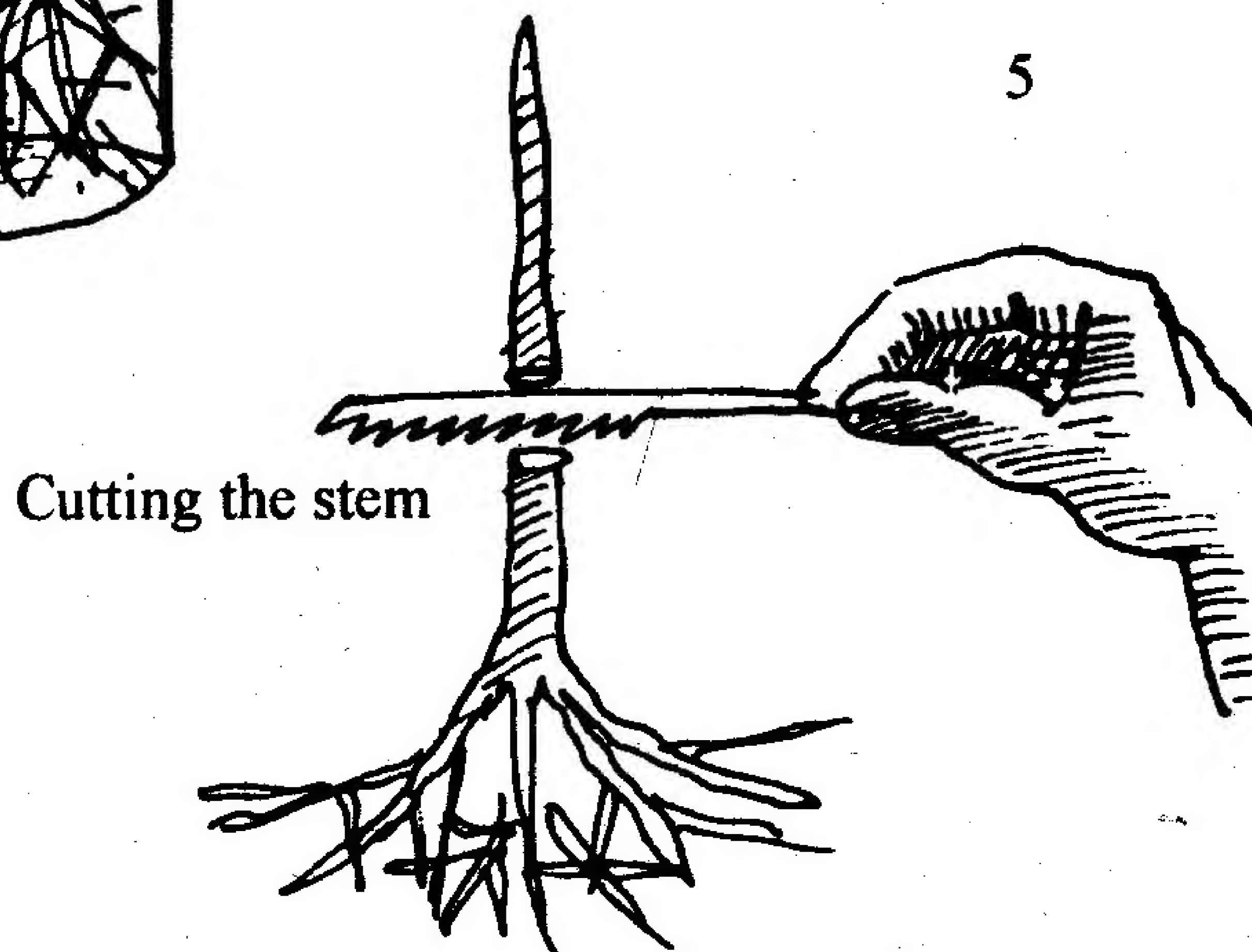
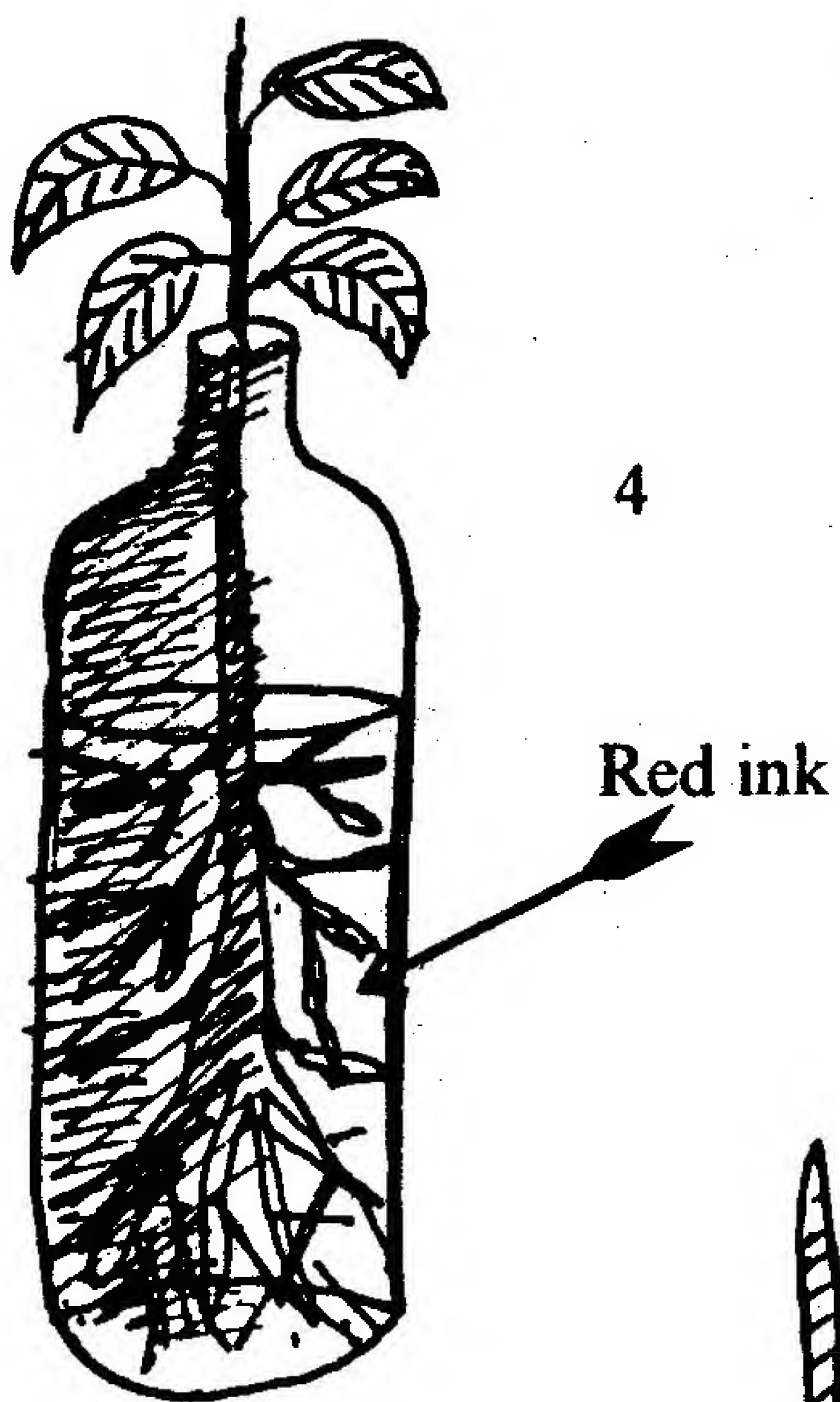
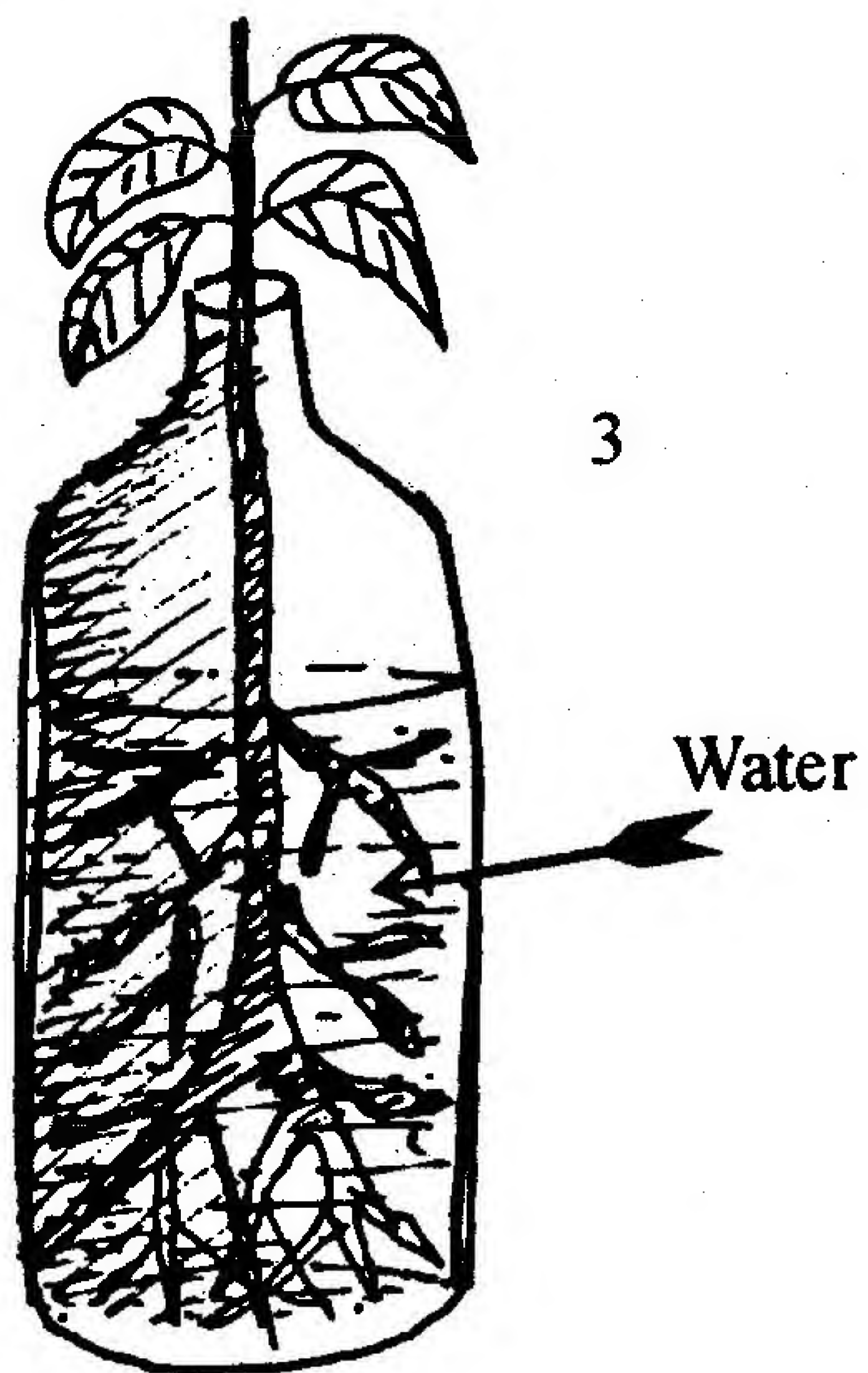
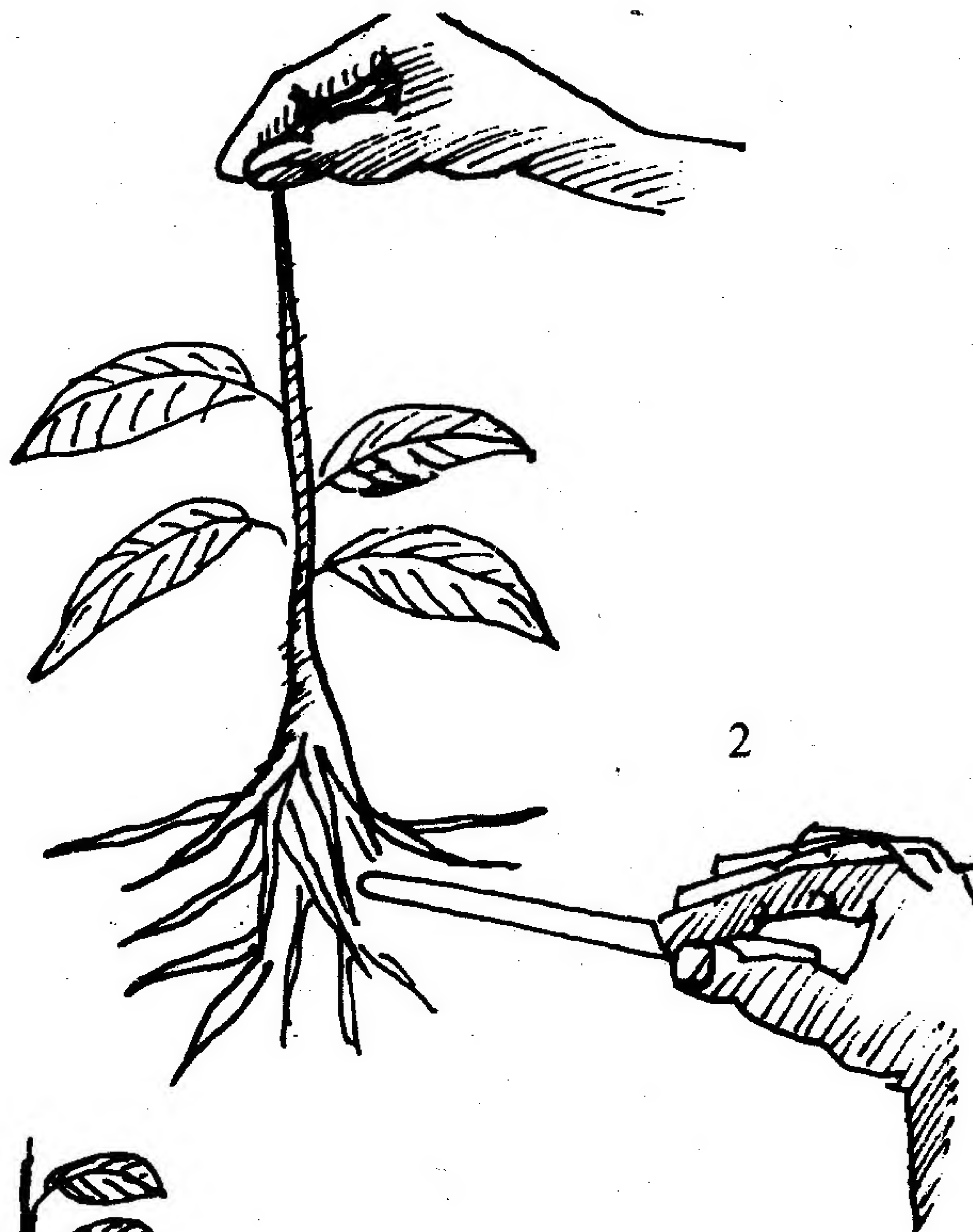
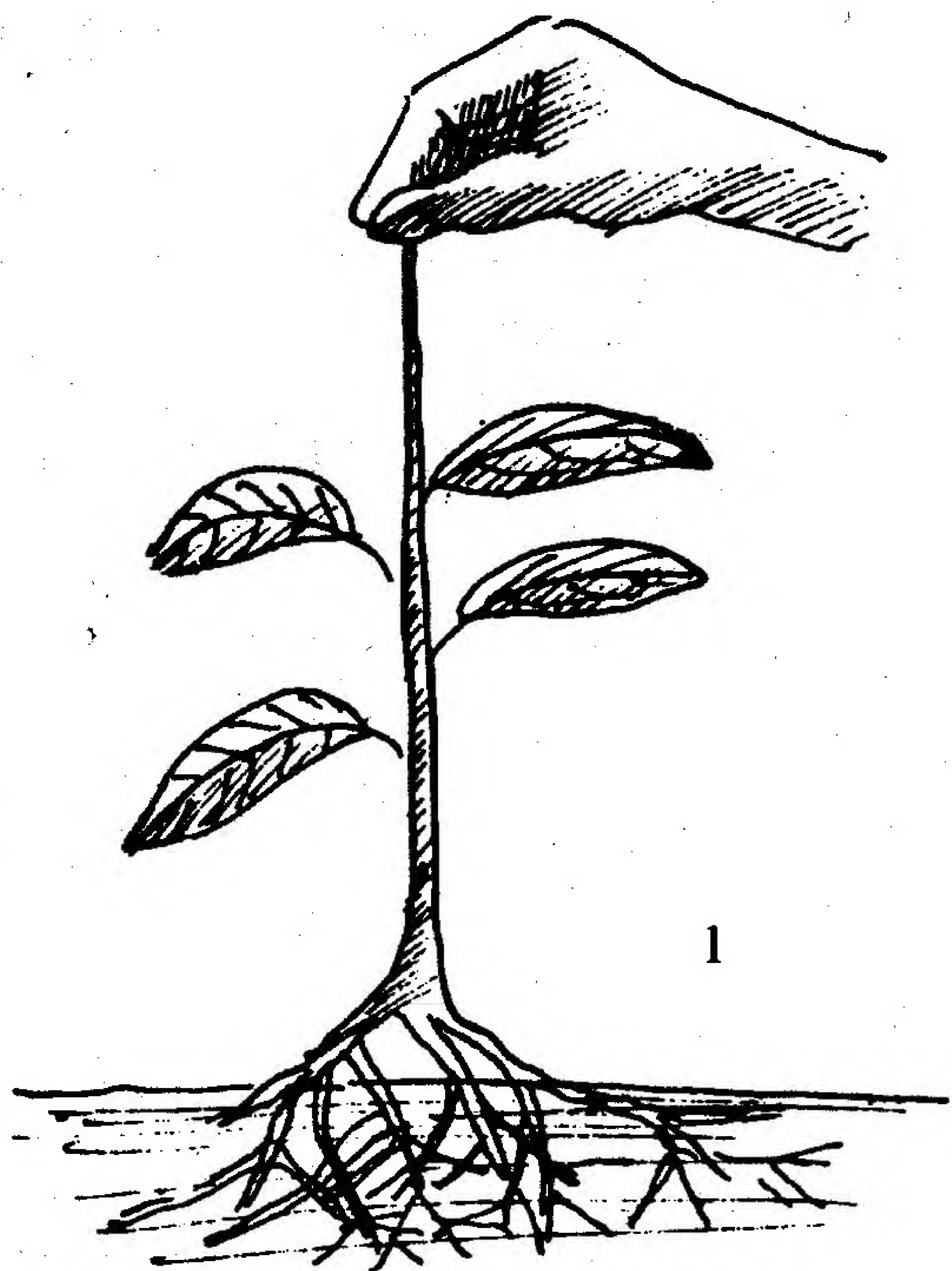
1. Put some hydrilla plant or water weed in a jar.
2. Cover the weed with a inverted funnel and a test tube.
3. Fill the jar with water.
4. Place the set-up in sun light.
5. Wait for 2 or 3 days.

Observations

1. Test the gas in the test tube for oxygen using a glowing splint.

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Cutting the stem

ACTIVITY - 12

Materials	Specification	Qty.	Remarks
1. Balsam plants	-	2	Two wild plants.
2. Beaker	-	2	Bottle
3. Red ink	-	-	Eosin dye
4. Blade	-	1	-

Instructions

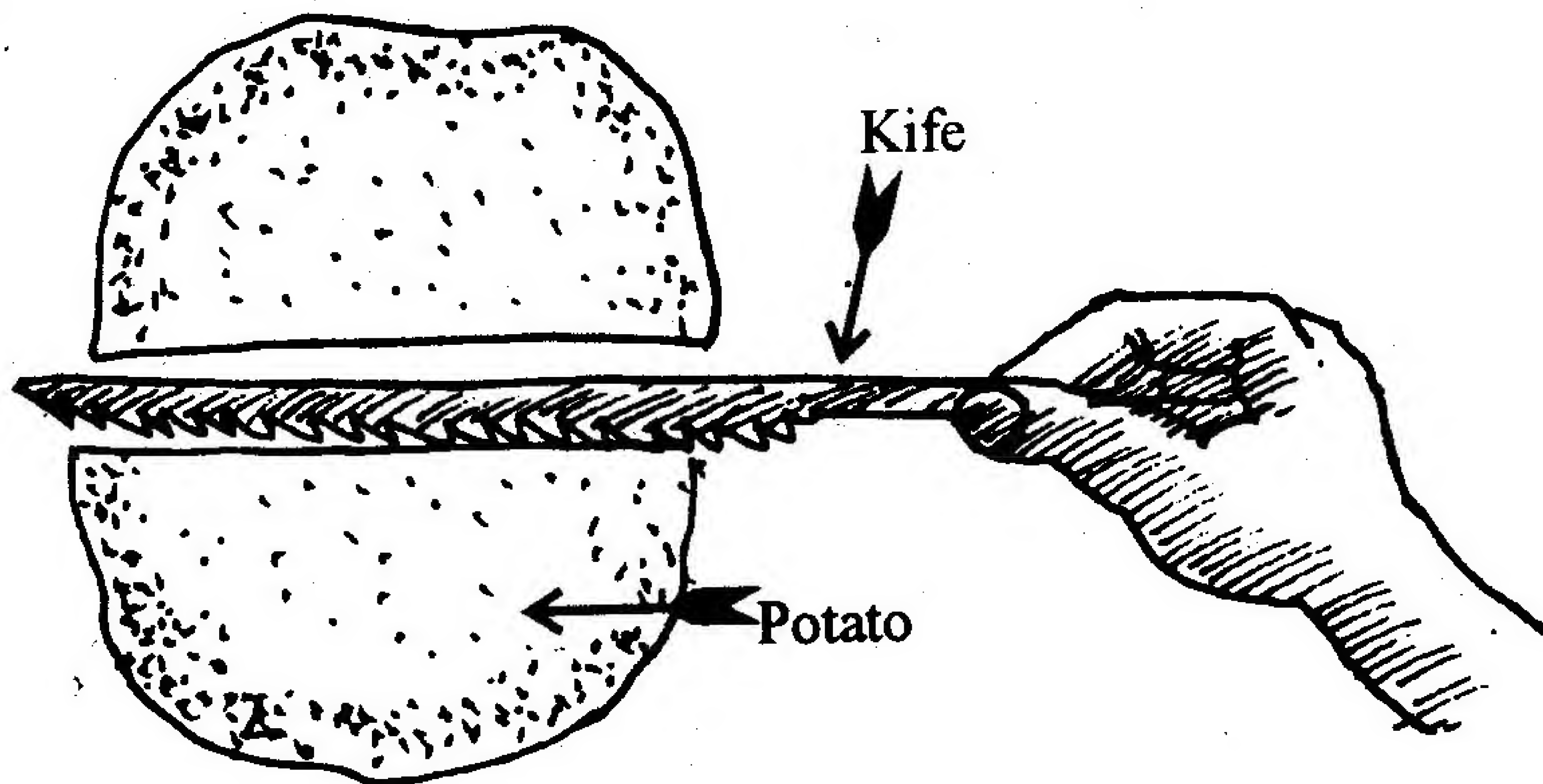
1. Uproot two balsam plants (balsaminus, impatiens) and wash off soil from their roots.
2. Stand the first plant in a beaker or bottle of water containing red ink (or eosin dye) for 3-5 hours.
3. Stand the second plant with its root dipped in water for the same duration.
4. Take the plants out and cut the stems into two with a blade.

Observations

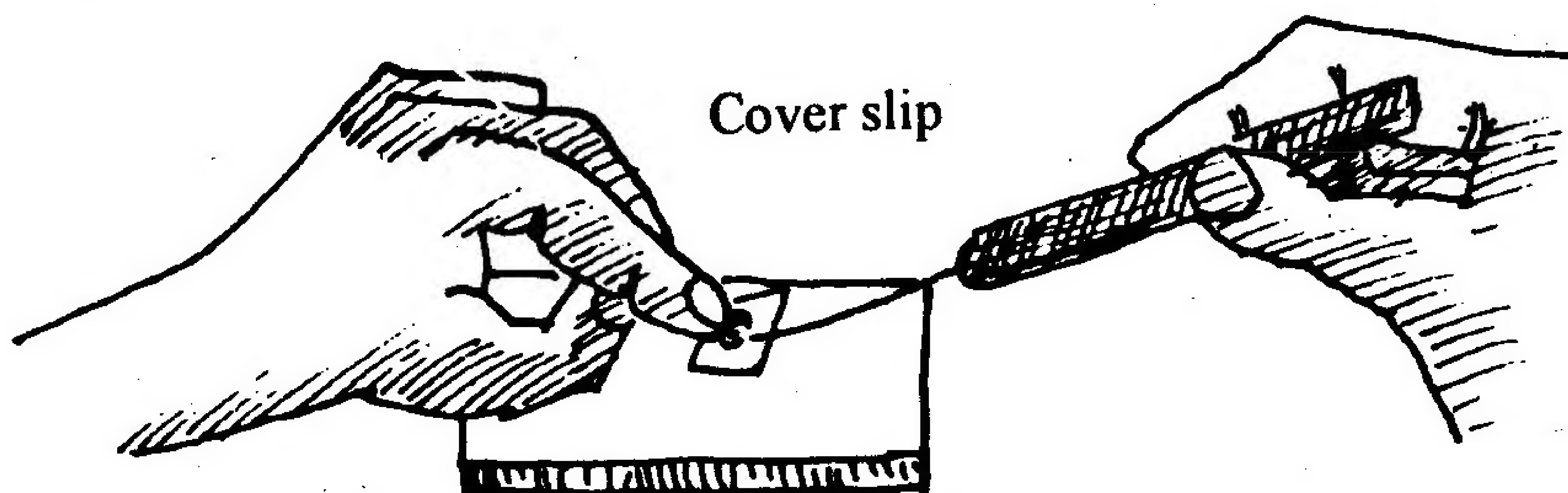
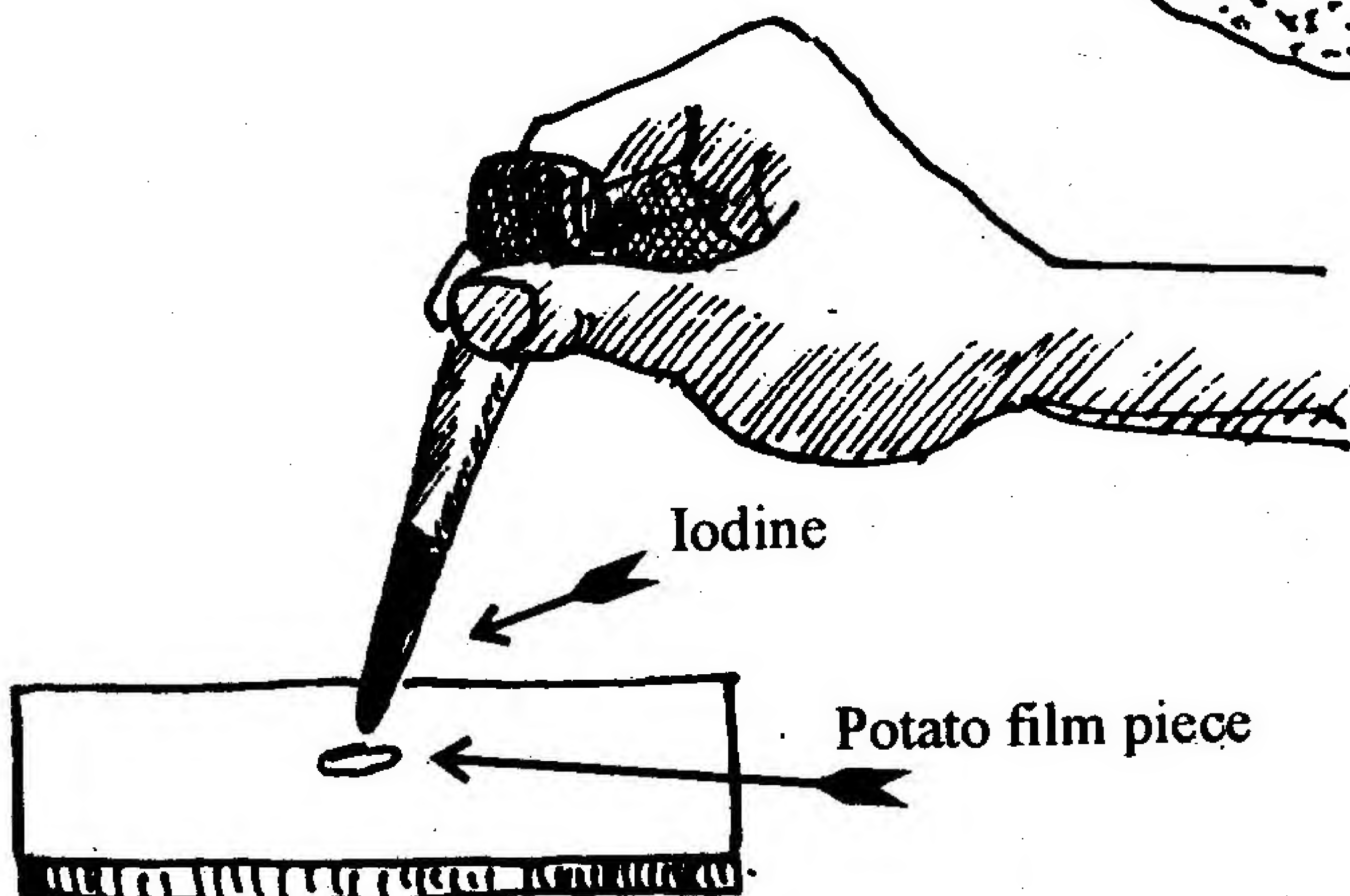
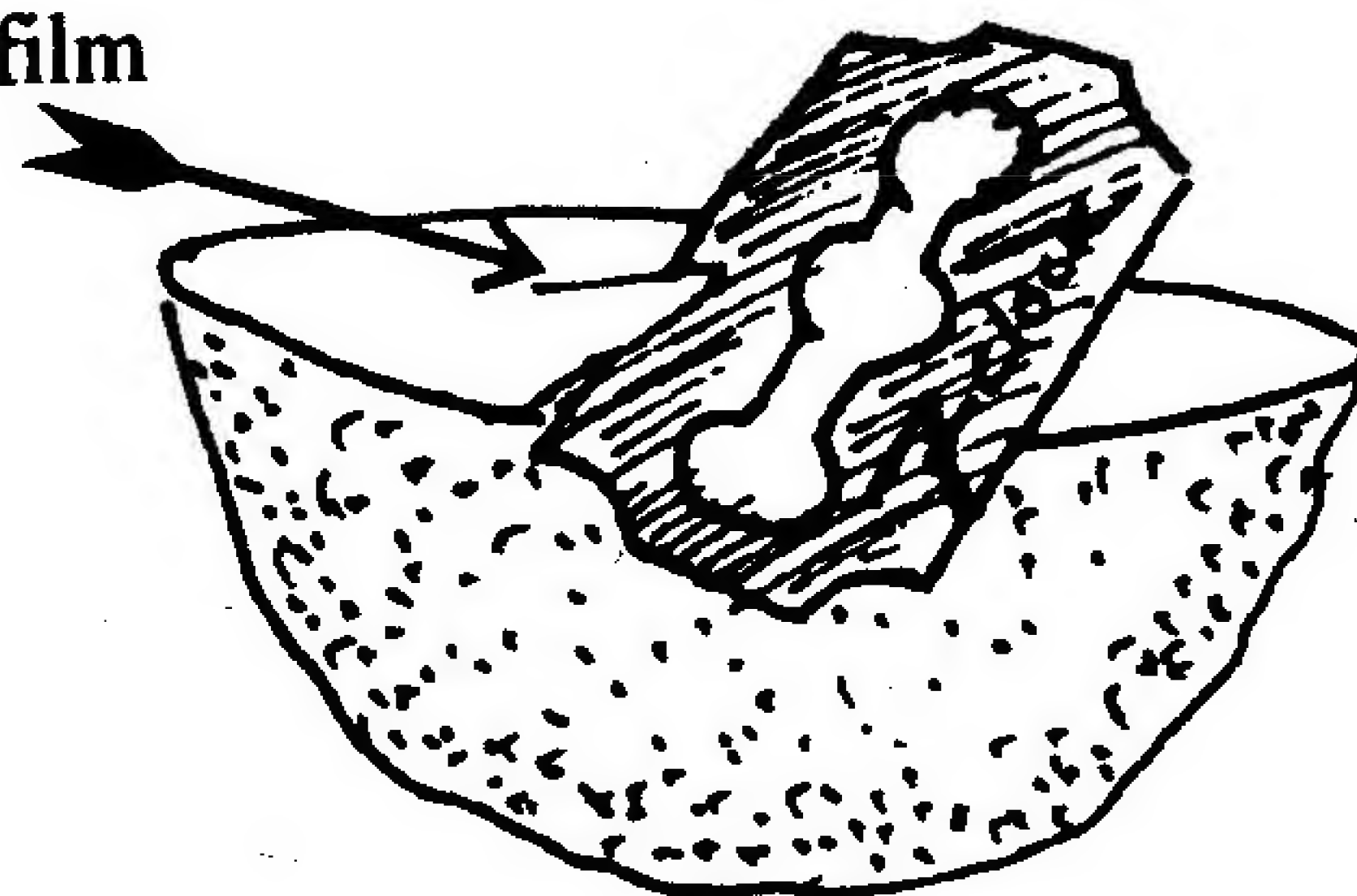
1. How does each of the stems appear?
2. Record the height of the dye travelled in the first plant merely by observing the plant.
3. What conclusions can you draw from the above activity.

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Scrapping a thin film



ACTIVITY - 13

Materials	Specification	Qty.	Remarks
1. Potato tuber	-	1	-
2. Scraper/blade	-	1	-
3. Slide	-	1	-
4. Microscope	-	1	-
5. Iodine solution	-	-	-

Instructions

1. Obtain potato and cut it into two halves with a knife.
2. Scrap off a very thin film of pulp with a blade.
3. Place the scrapped material on a slide.
4. Place a drop of iodine solution on the material.
5. Mount the slide on the microscope to observe.

Observation

- a) What do you observe?

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